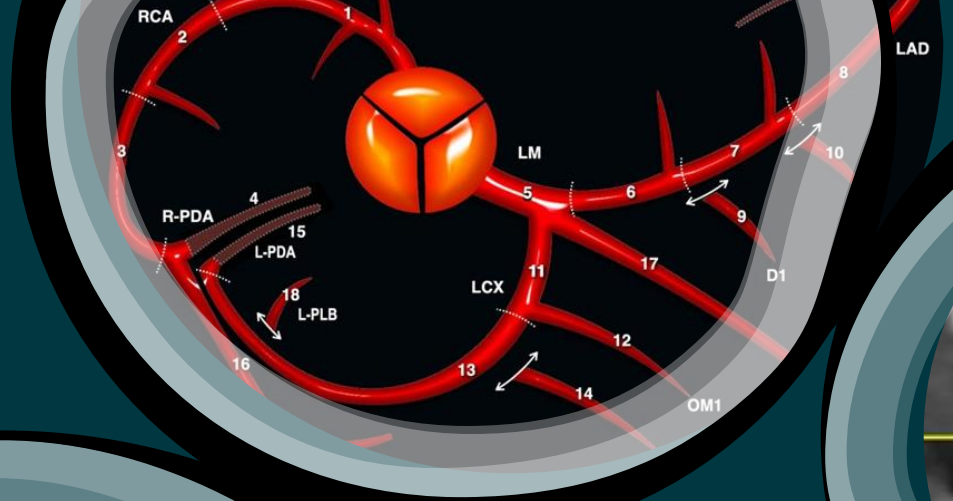
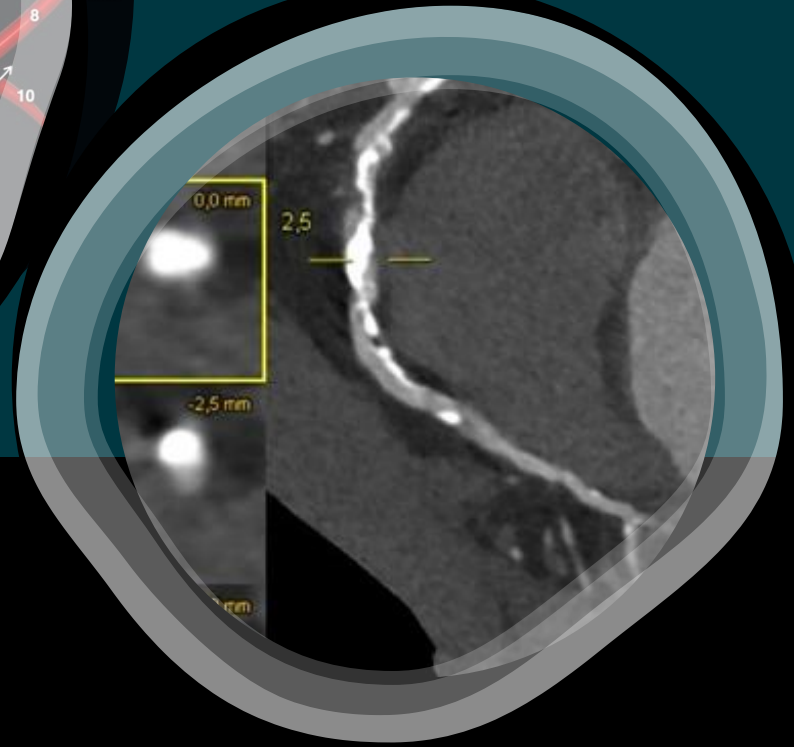
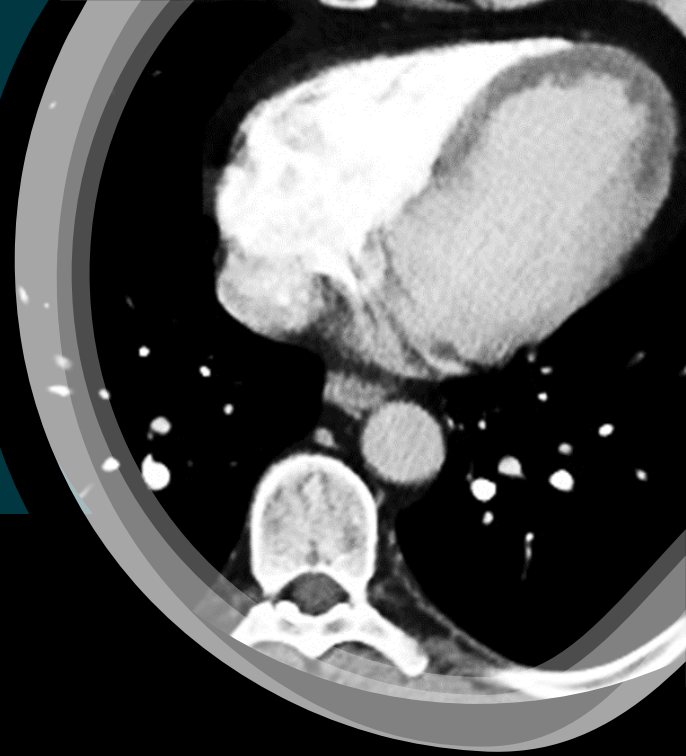
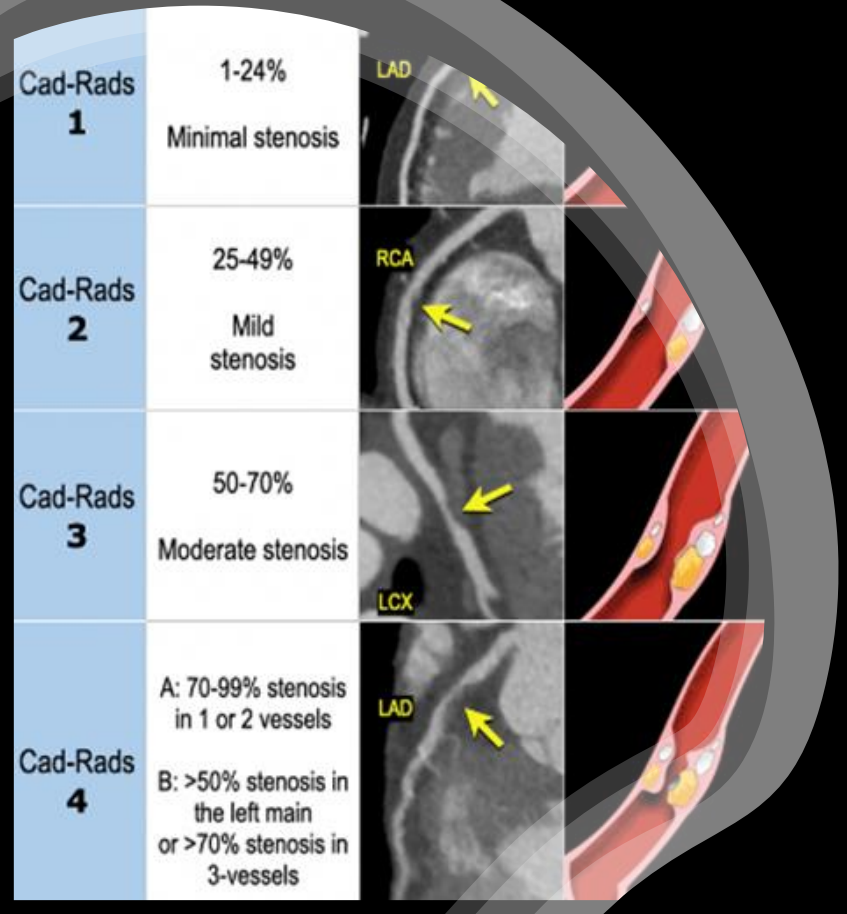








Acute Coronary Syndrome in the ED

Maeke Scheerder

Emergency/Trauma radiologist

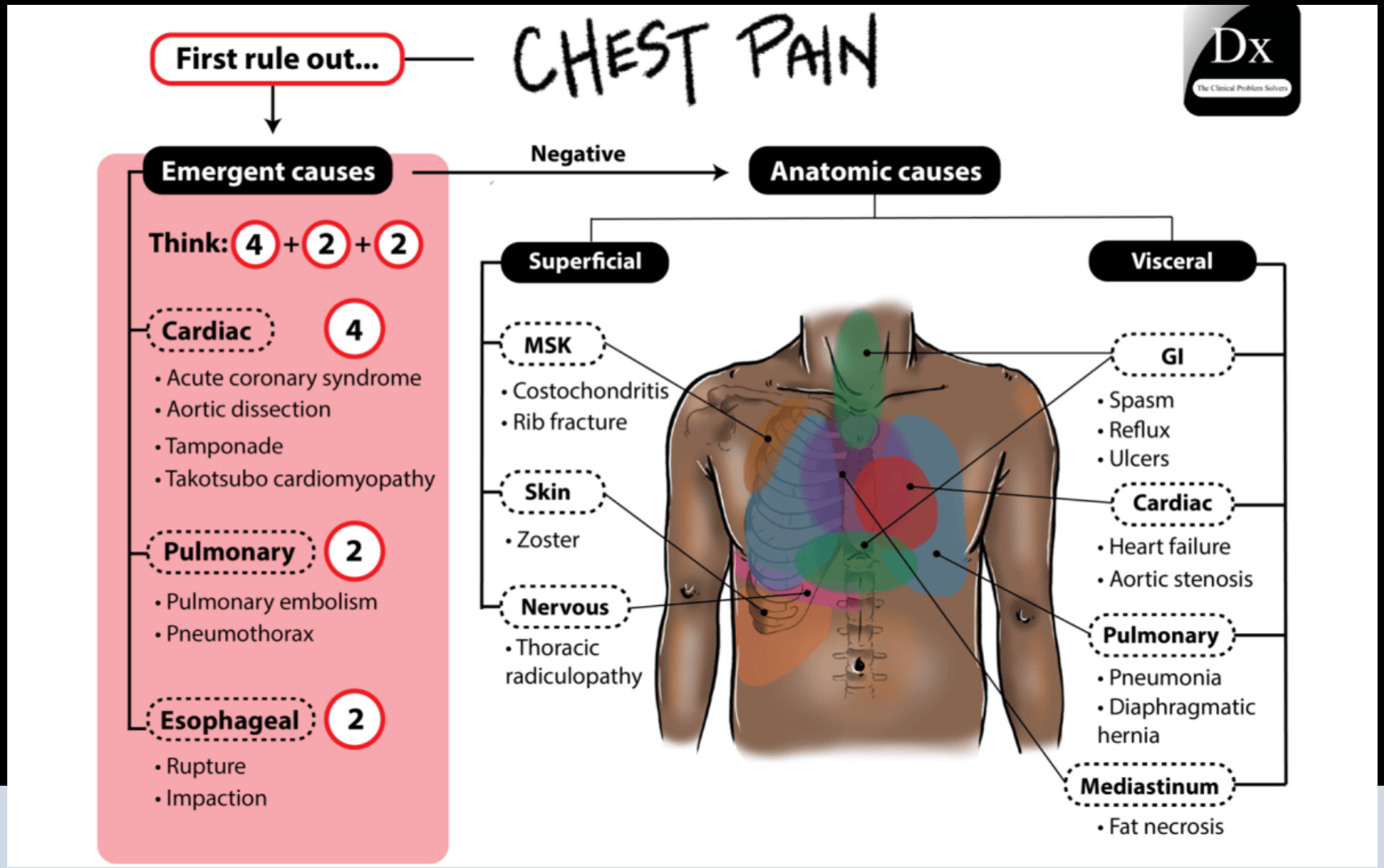
Amsterdam University Medical Centers

Amsterdam UMC
University Medical Centers

DISCLOSURE SLIDE

No relevant disclosures

When do we  coronaries in the ED



When do we  coronaries in the ED

ED

Chest pain

Cardiac
(ECG/ troponine)

CTA coronaries

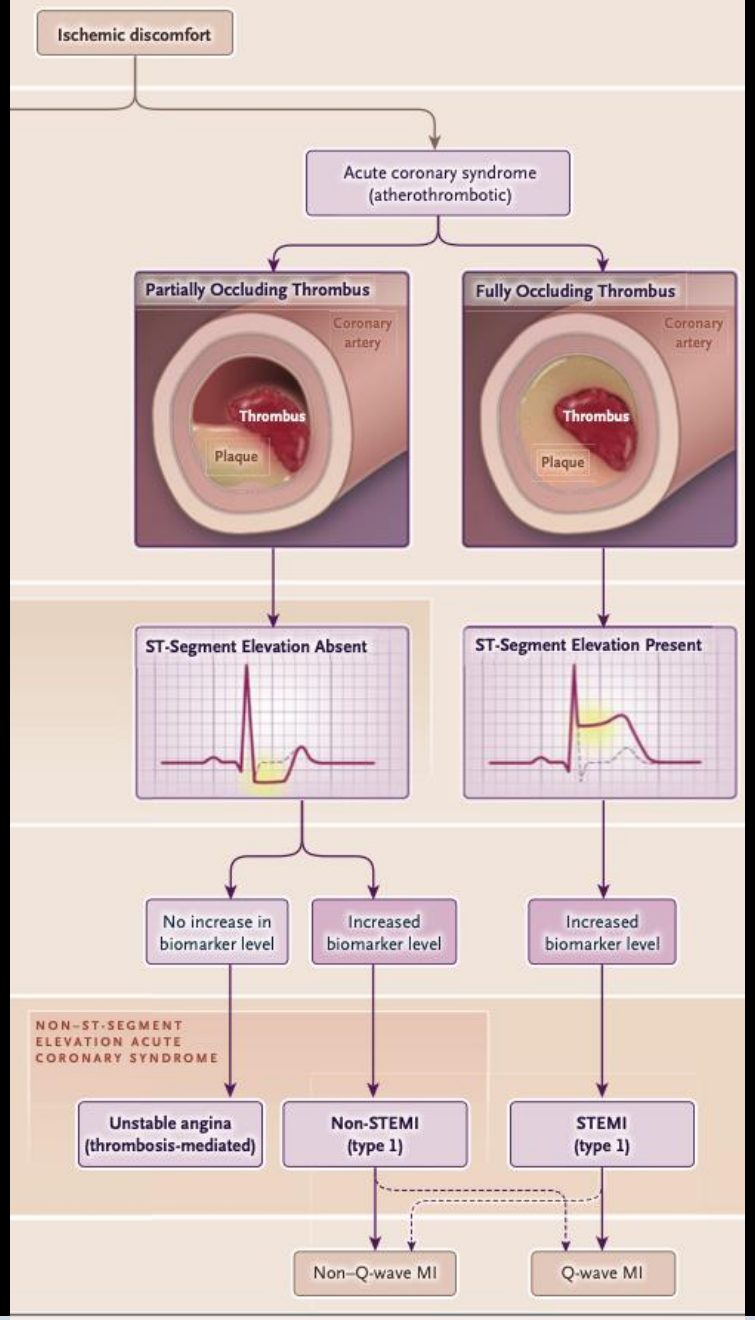
Chest pain
Otherwise

“triple-rule-out” (TRO-)CTA

“Accidental” finding

Trauma
Stroke
AAS

Always think about cardiac pathology / causes in the ED!



Acute coronair syndroom

- STEMI
- Non-STEMI
- Unstable angina

➢ Med: antithrombotica and antiplatelets therapy

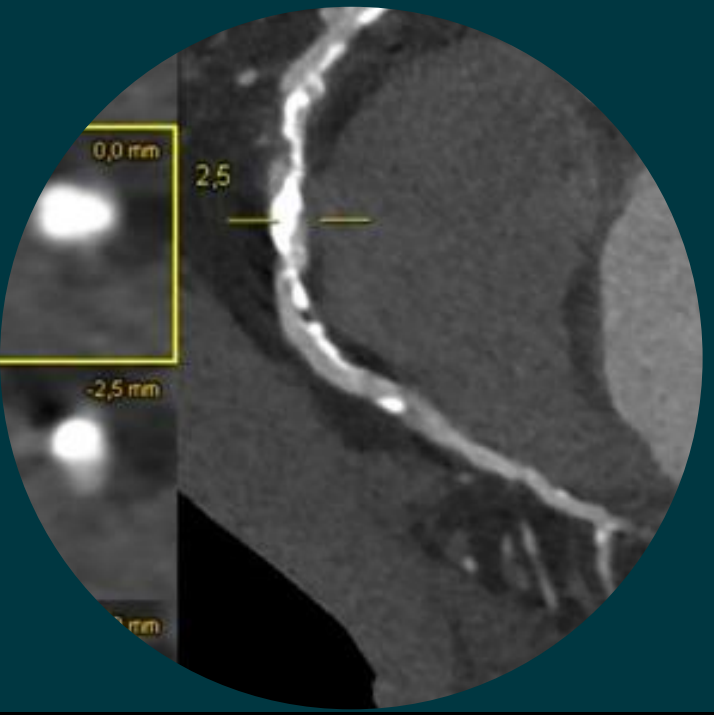
➢ Admission cardiac care unit monitor heart rythm

➢ Invasive coronary angiography

New Engl J Med website:
https://resident360.nejm.org/content_items/acute-myocardial-infarction

Aims

- Introduction imaging coronaries
- Overview cardiac pathology, focus on coronaries
- Cases
- Take home message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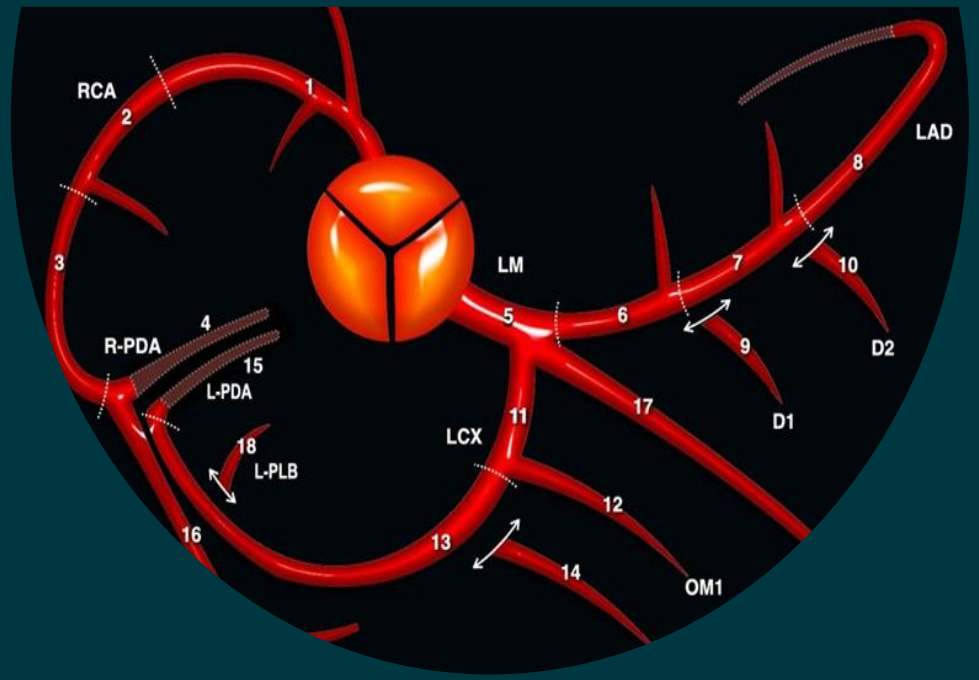
2,5
-2,5 mm


RCA
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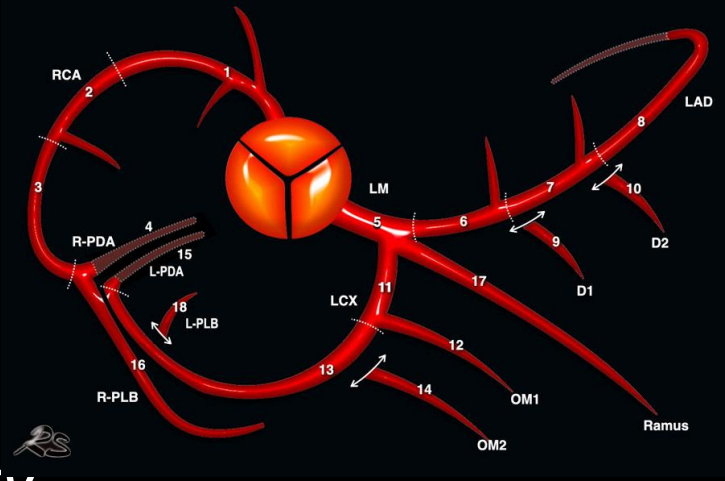
LM
LAD
8
7
10
5
6
9
D2
4
R-PDA
15
L-PDA
11
17
D1
LCX
18
L-PLB
12
16
13
14
OM1

CORONARIES

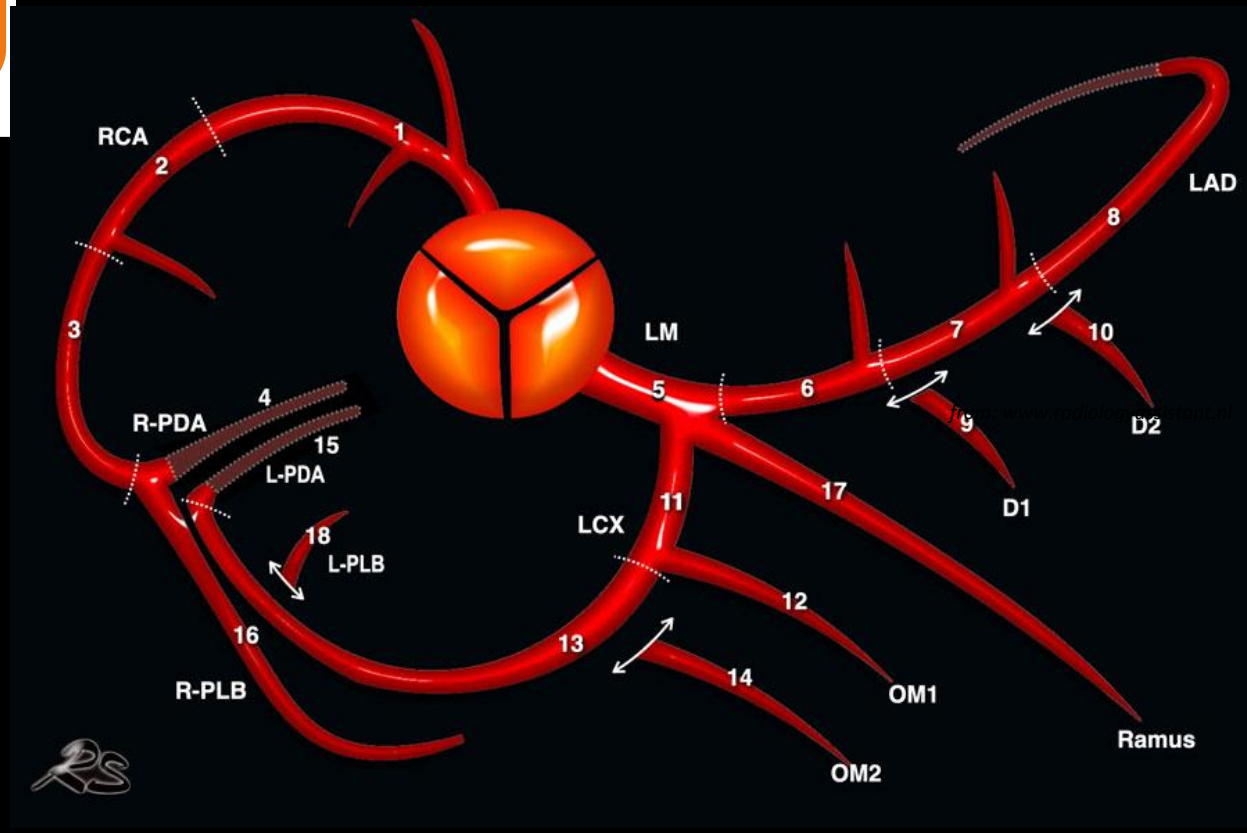
Coronaries



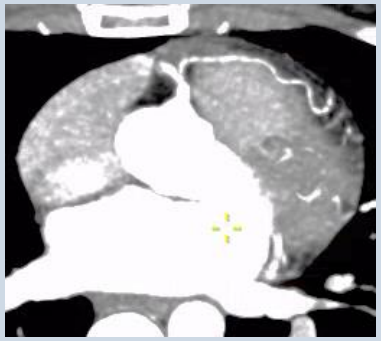
Anatomy	*Origin RCA and LM* *Course to its perfusion territory*
Dominance	*Right, Left, Balanced*
Lumen	*Stenosis* *Patency (CABG)*
Myocardium	*Perfusion defect* *Infarction*

Coronaries

RCA	*Proximal*		
	Mid		
	Distal		
LM	-		
LAD	*Proximal*		
	Mid	LCx	*Proximal*
	Distal		*Distal*
(Ramus)	(Diagonal)	(OM)	



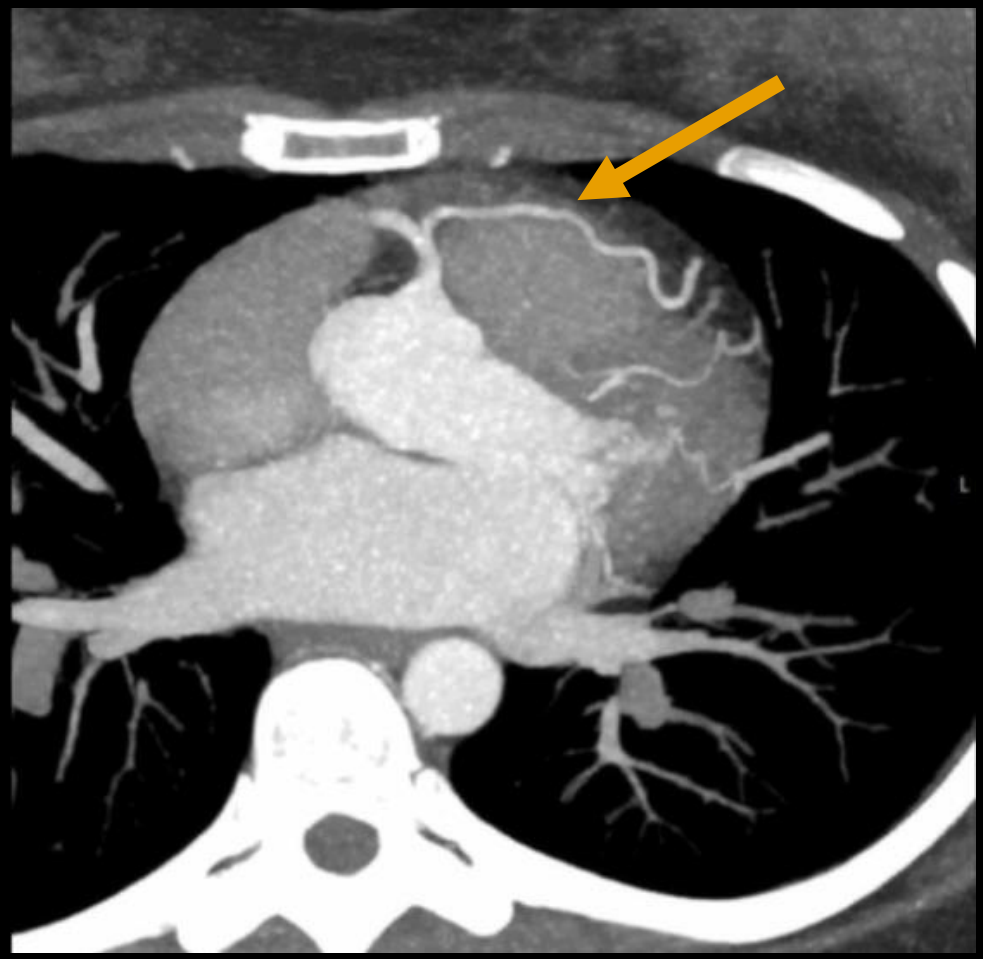
Coronary anomaly



DDx
- Anomaly
- Atherosclerosis
- SCAD
- Other

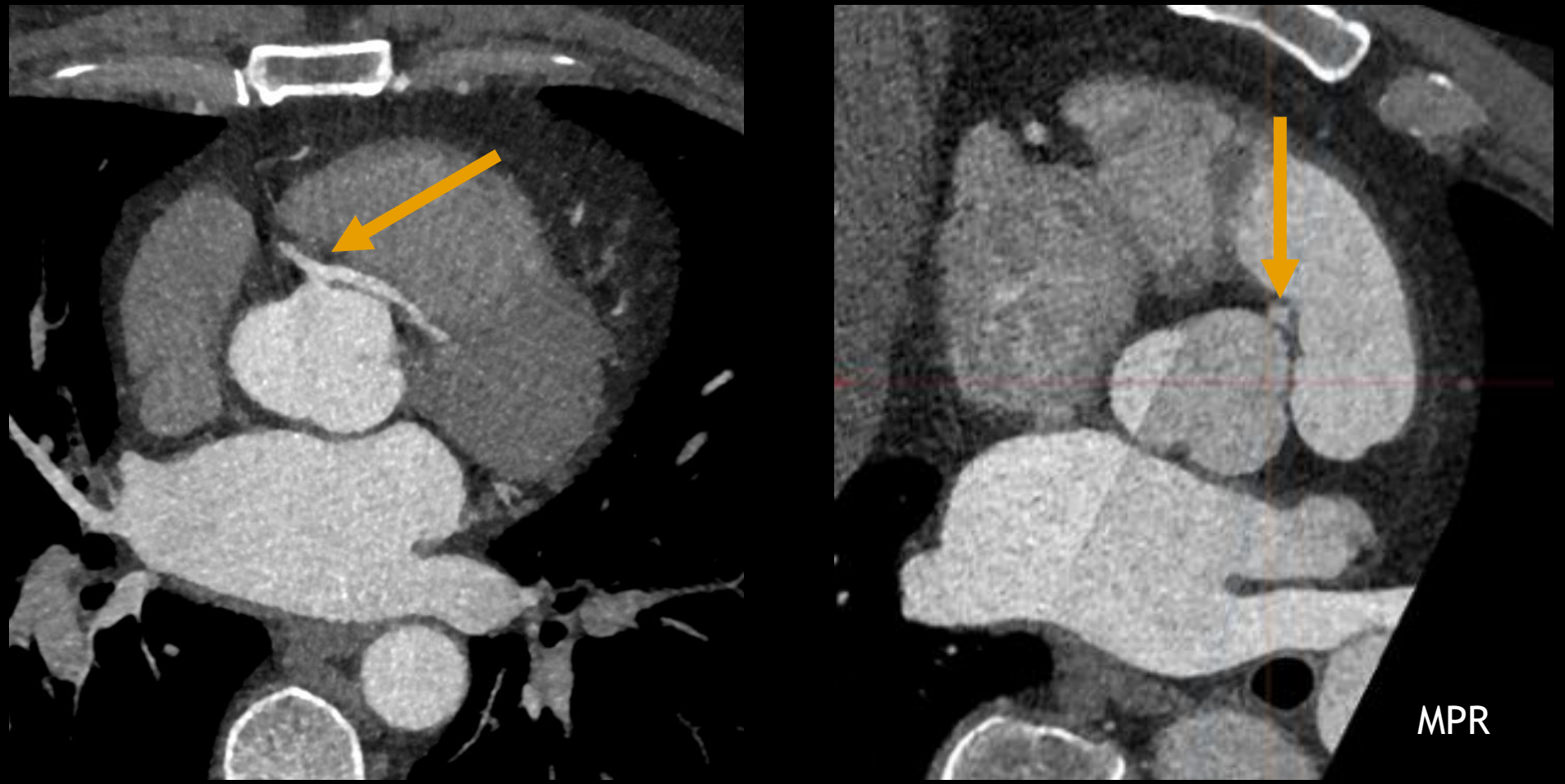
"Abnormal origin or abnormal course, or combination of both."

Origin	LCC, RCC, NCC *(PA)*
Course to its perfusion territory	***Prepulmonic***
	Retroaortic
	Interarterial
	Trans-septal



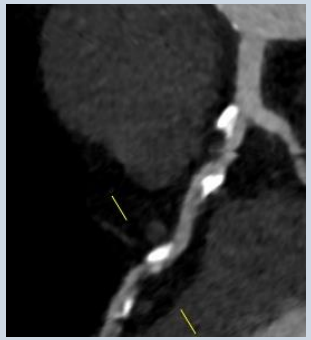
LAD from RCA in prepulmonic course

RCx from RCC in retroaortic course



Monocoronary, with LM from RCA and interarterial course

Atherosclerosis



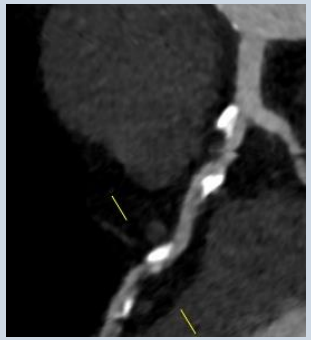
DDx
- Anomaly
- Atherosclerosis
- SCAD
- Miscellaneous

Atherosclerotic plaque	*Luminal stenosis degree* *Partially-, Non-, Calcified* *High risk features*
Myocardium	*Perfusion defect*

Stenosis

Degree of luminal stenosis

Cad-Rads	Stenosis
Cad-Rads **0**	0% No stenosis
Cad-Rads **1**	1-24% Minimal stenosis
Cad-Rads **2**	25-49% Mild stenosis
Cad-Rads **3**	50-70% Moderate stenosis
Cad-Rads **4**	A: 70-99% stenosis in 1 or 2 vessels B: >50% stenosis in the left main or >70% stenosis in 3-vessels
Cad-Rads **5**	100% total occlusion

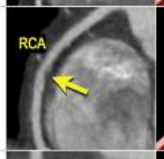


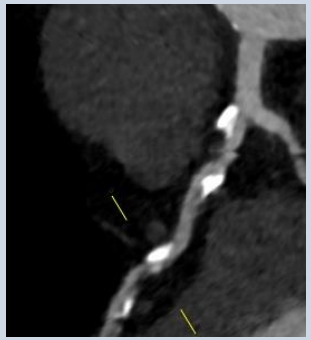
DDx

- Anomaly
- Atherosclerosis
- SCAD
- Miscellaneous

Stenosis

Degree of luminal stenosis

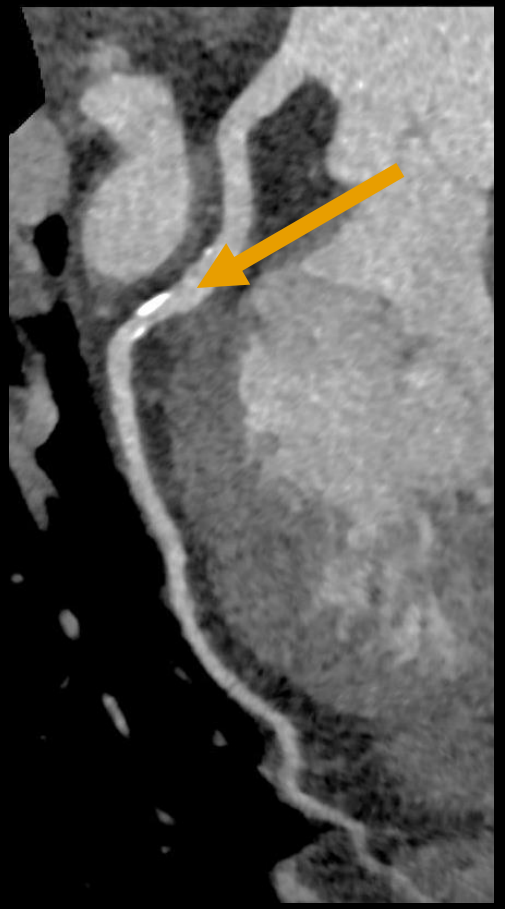
Cad-Rads	Stenosis	CT imaging	Illustration
Cad-Rads **0**	0% No stenosis		
Cad-Rads **1**	1-24% Minimal stenosis		
Cad-Rads **2**	25-49% Mild stenosis		
Cad-Rads **3**	50-70% Moderate stenosis		
Cad-Rads **4**	A: 70-99% stenosis in 1 or 2 vessels B: >50% stenosis in the left main or >70% stenosis in 3-vessels		
Cad-Rads **5**	100% total occlusion		



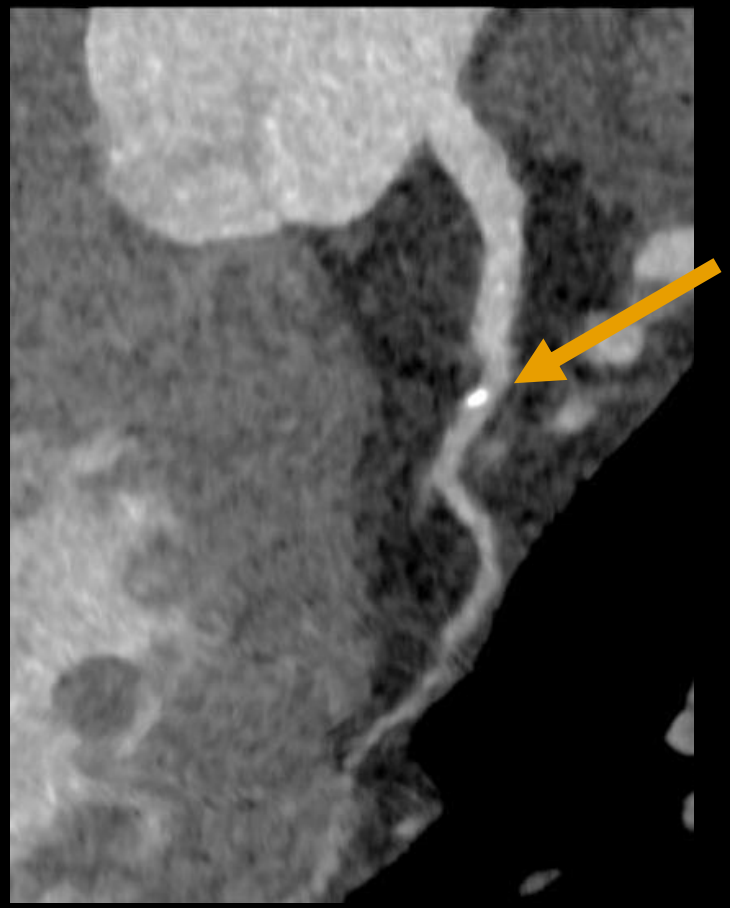
DDx

- Anomaly
- Atherosclerosis
- SCAD
- Miscellaneous

RCA



LCX



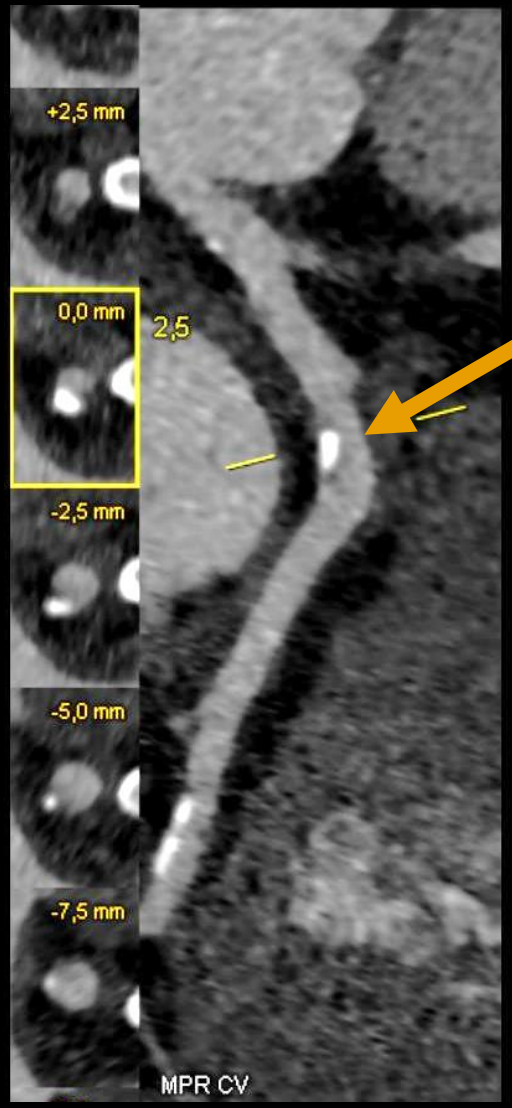
LAD

25-49% stenosis (CADRADS 2)

Chest pain

LAD

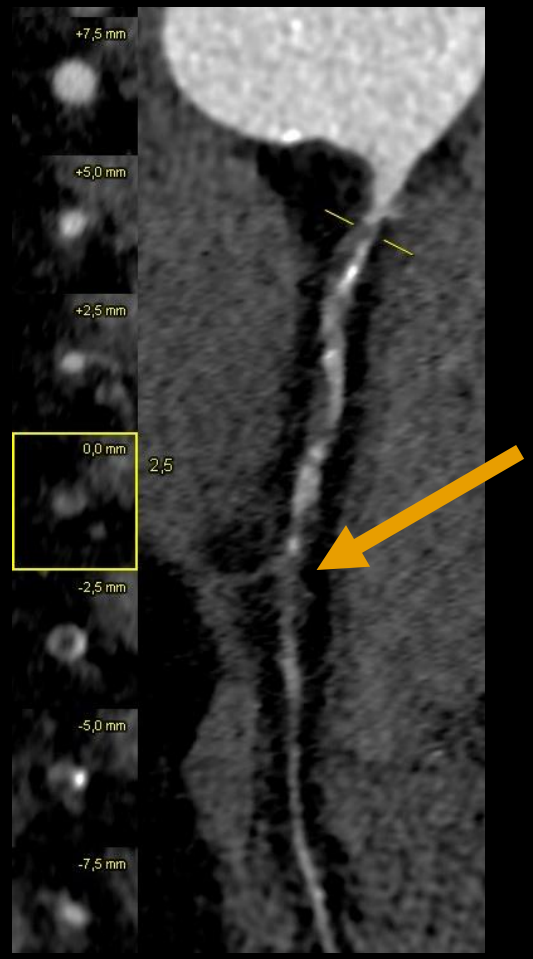
OM



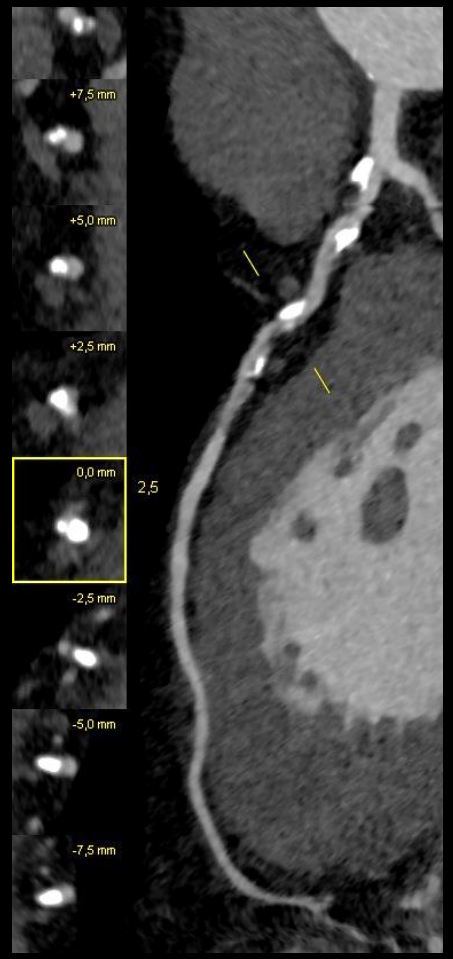
LCx

25-49% stenosis (CADRADS 2/S)

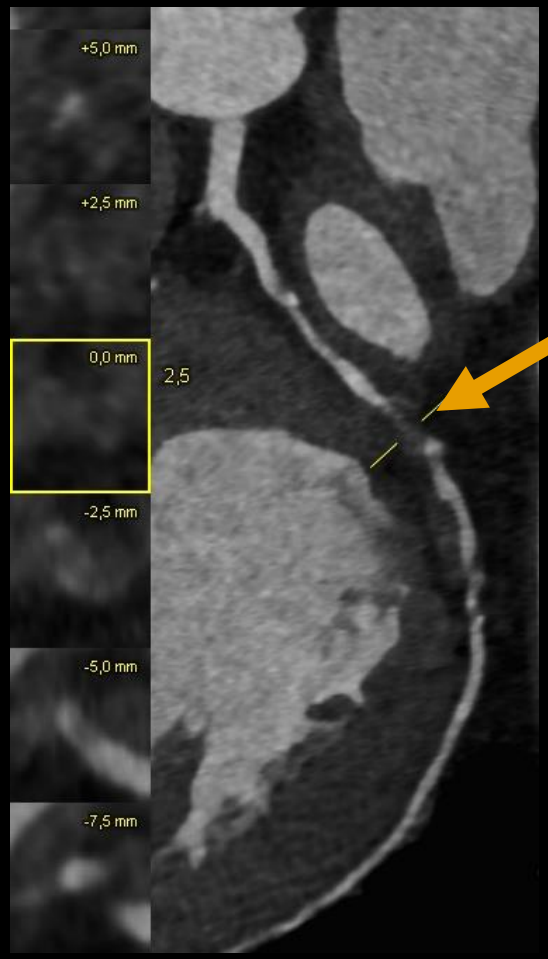
Chest pain. Known CAD



RCA



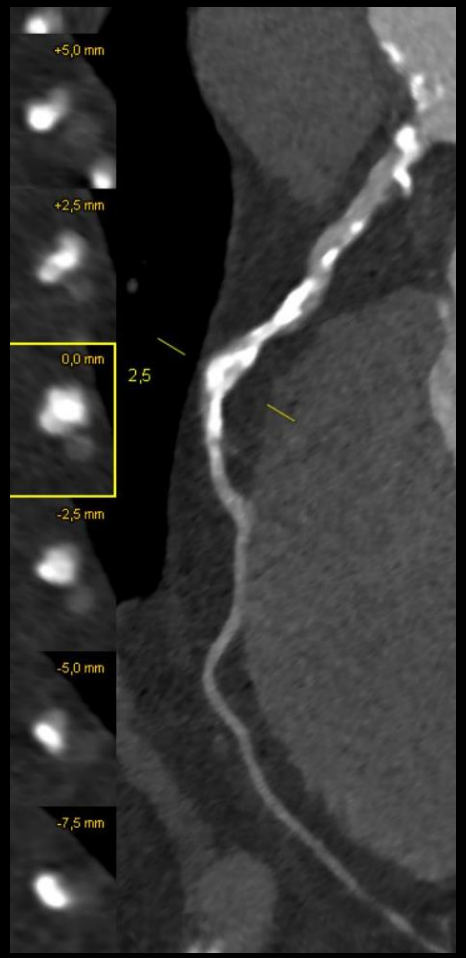
LAD



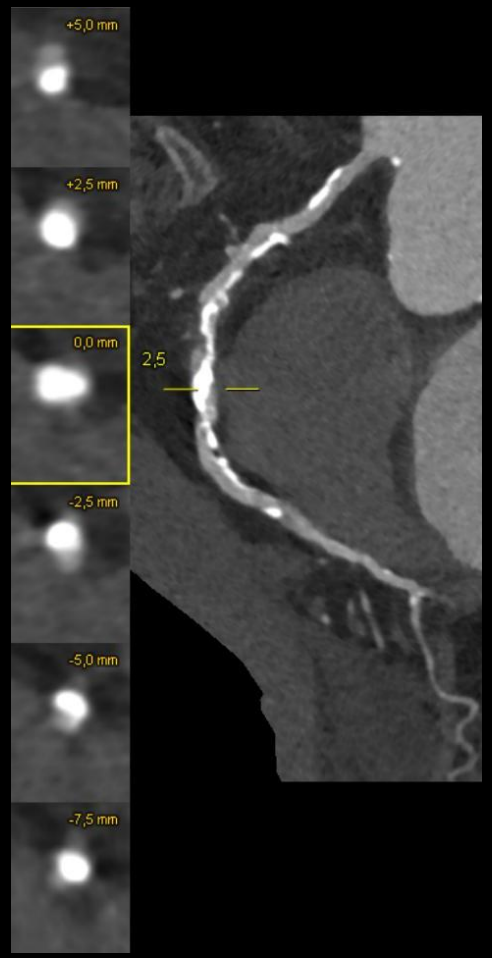
LCx

100% stenosis (CADRADS 5)

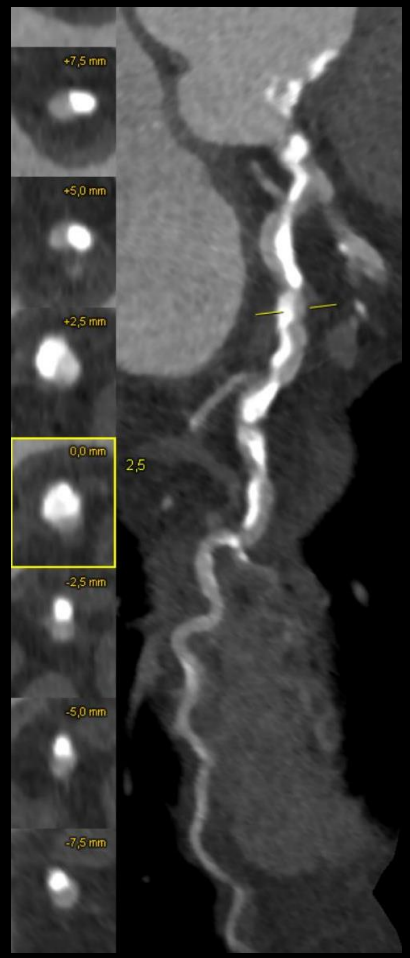
Chest pain. Severe CAD



LAD



RCA

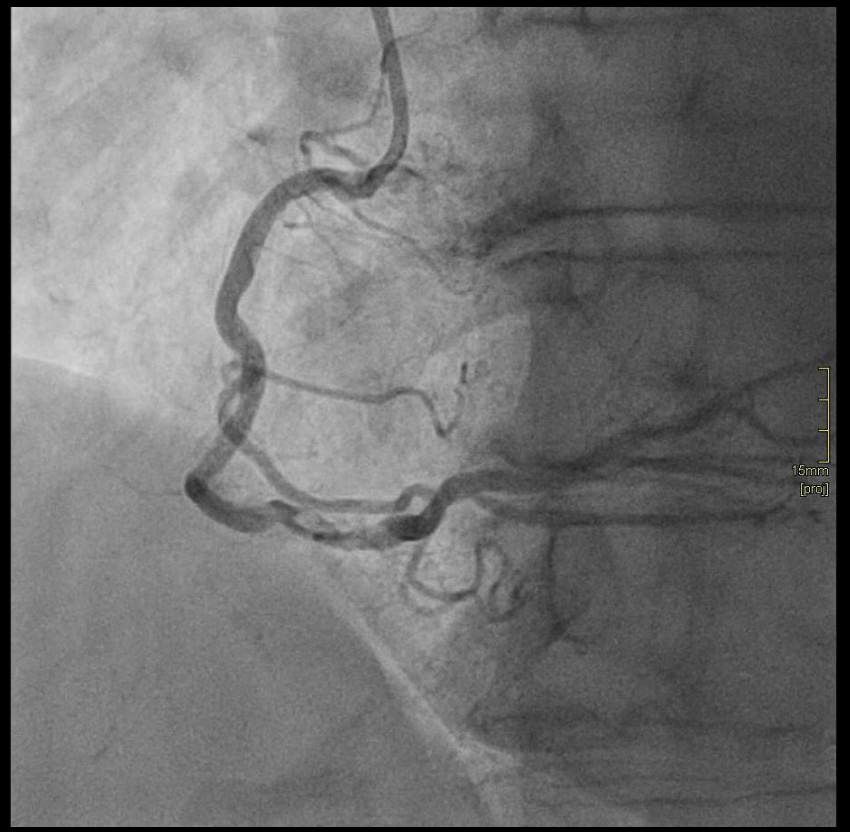


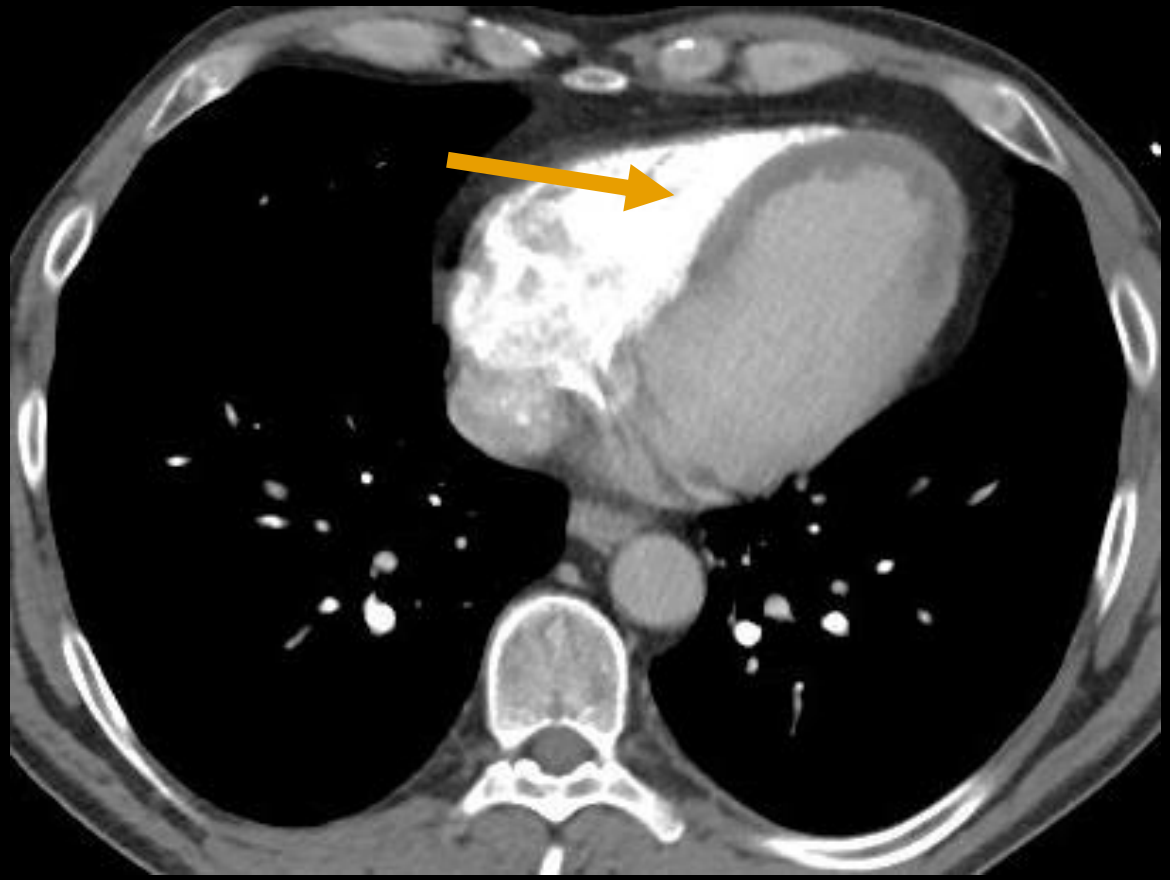
LCx

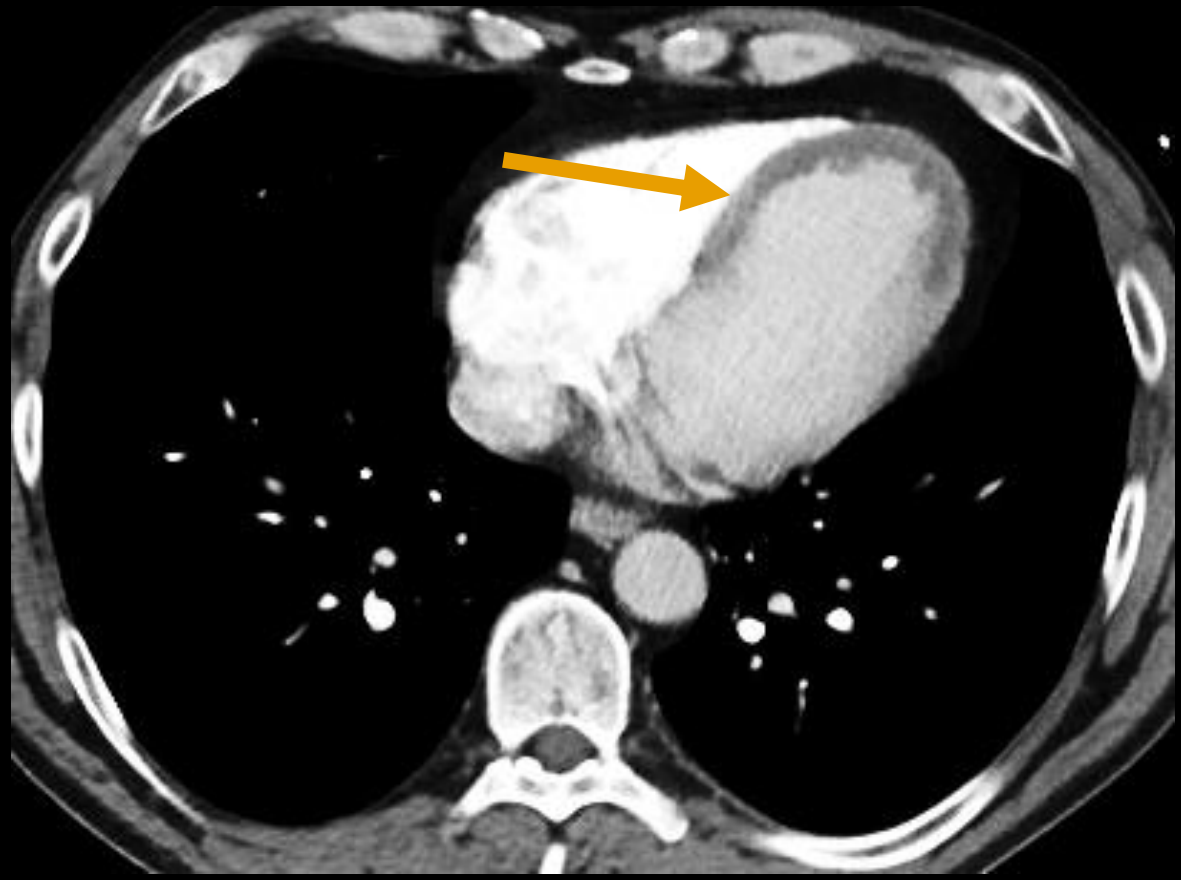
Probably significant stenosis (CADRADS N)

Addittional imaging

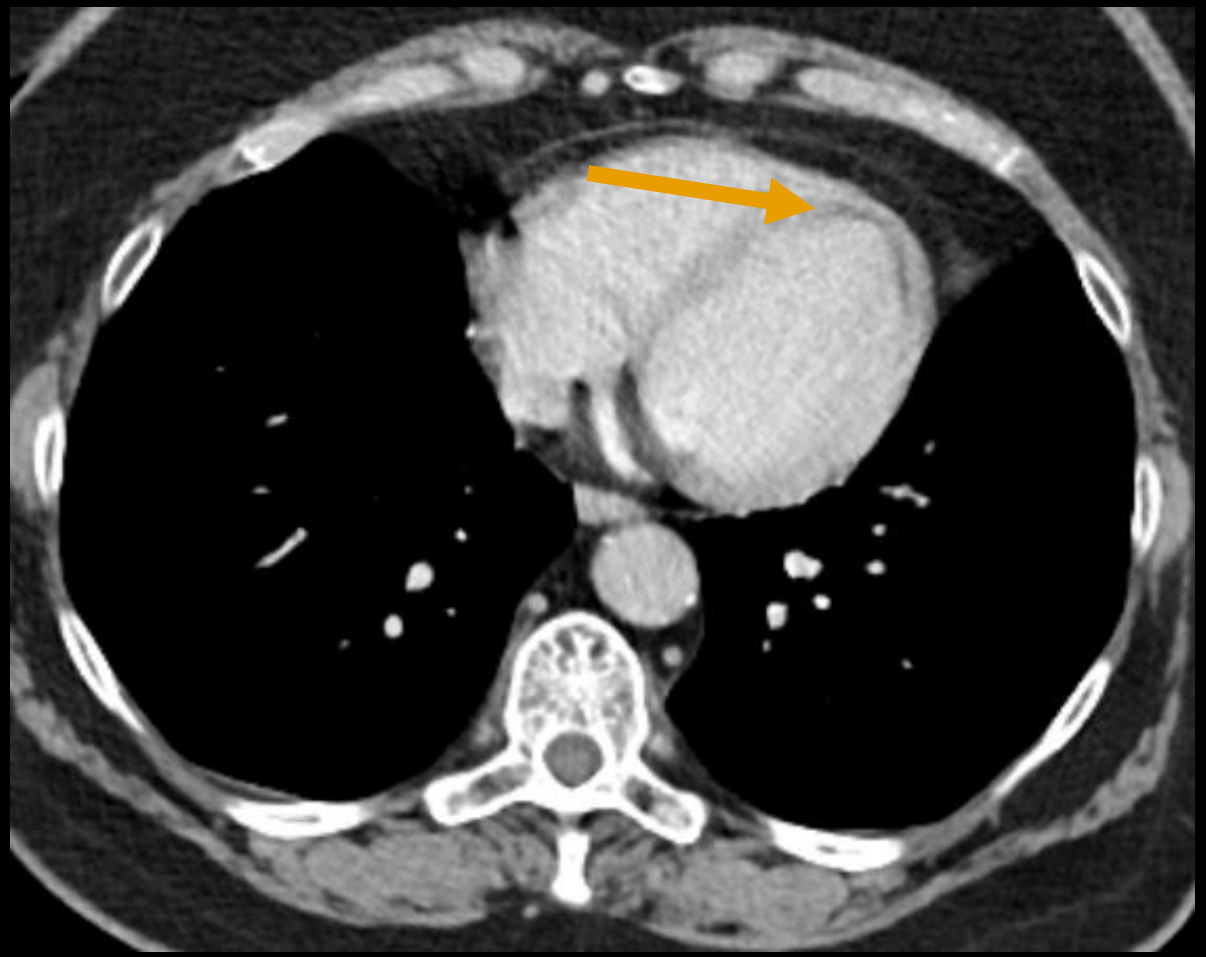
Significant stenosis or N
→ Coronary angiogram

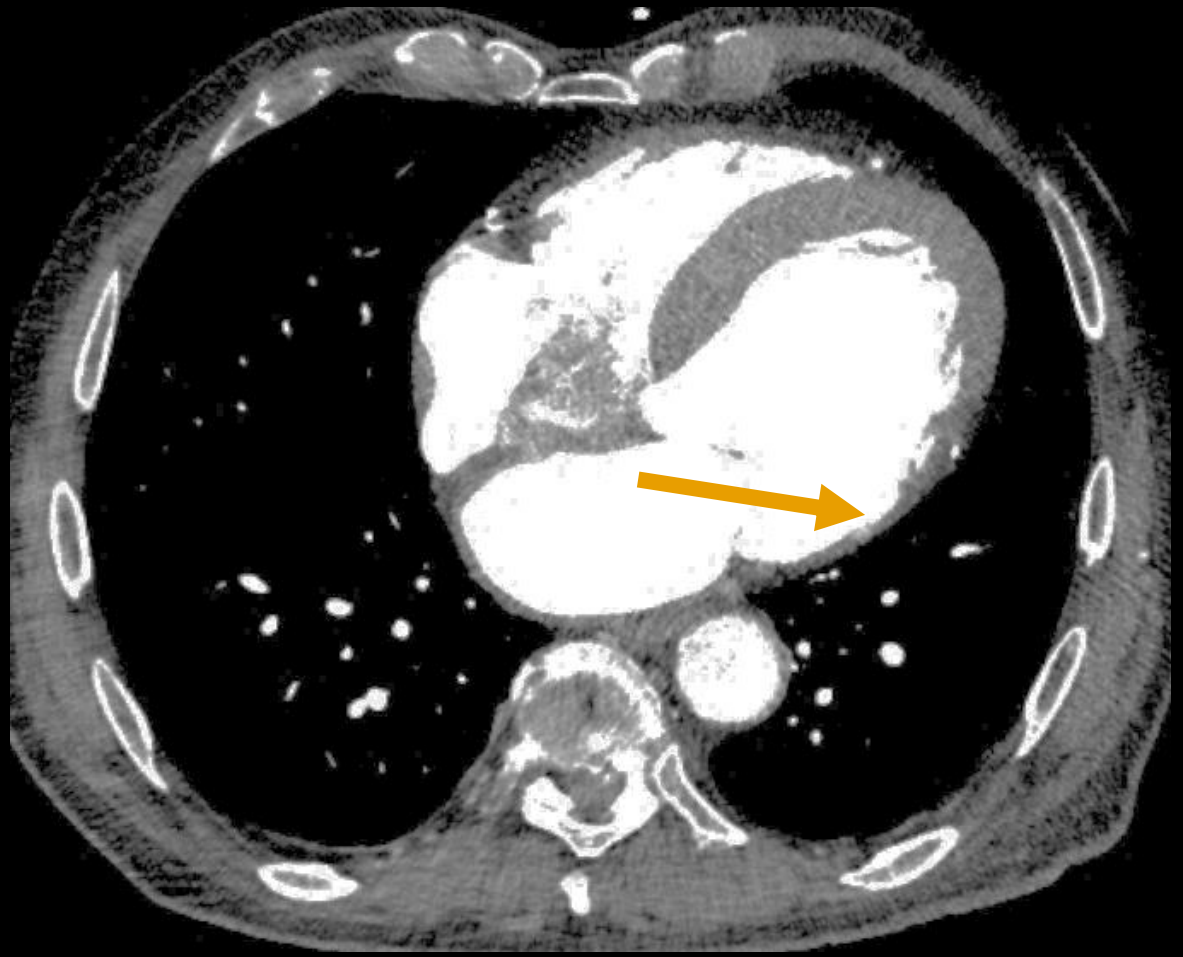






Acute myocardial perfusion defect in LAD territory





Examples of an old myocardial infarction

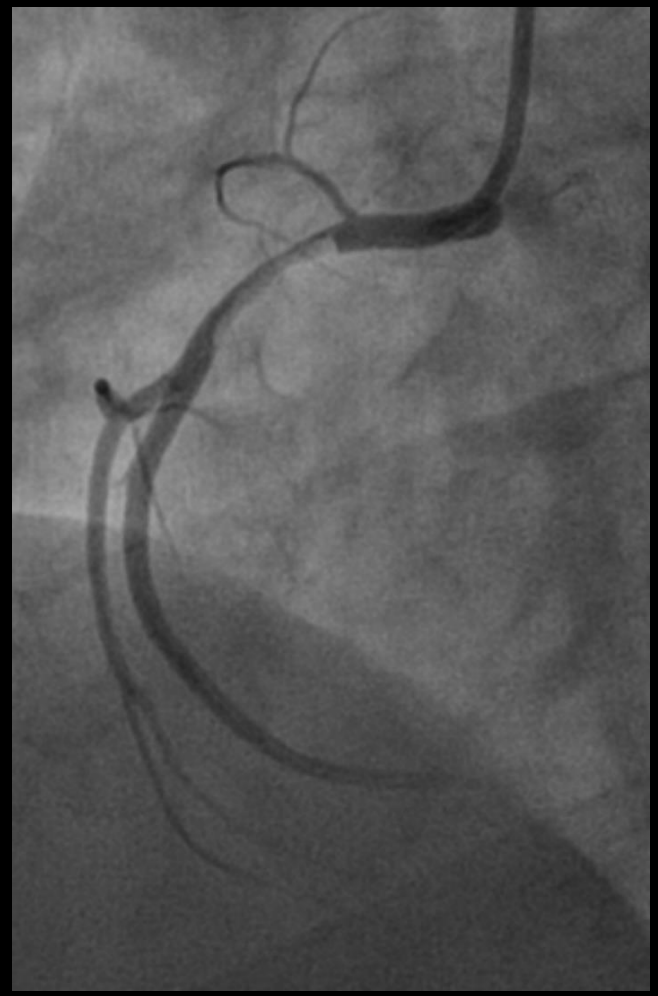
DDx
- Anomaly
- Atherosclerosis
- SCAD
- Miscellaneous

SCAD

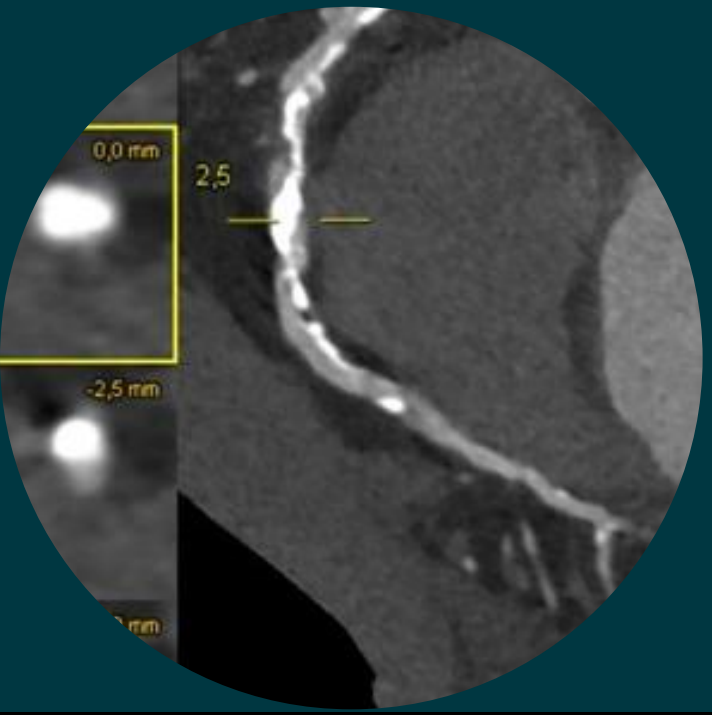
"Spontaneous, non-iatrogenic dissection of coronary artery, not associated with atherosclerosis or trauma."

Associations

Fibromuscular dysplasia (FMD)
Connective tissue disease
Pregnancy/peripartum
Toxins (eg. Cocaine)



No relevant Hx - SCAD in proximal RCA


0,0 mm
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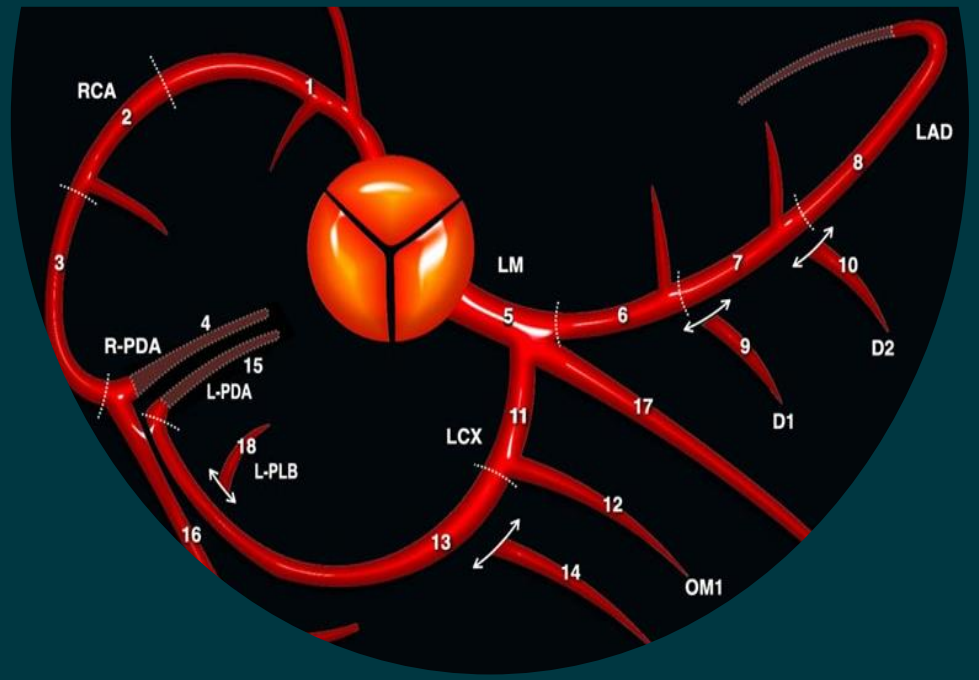
-2,5 mm


RCA
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LM
LAD
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D2
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R-PDA
15
L-PDA
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17
D1
LCX
18
L-PLB
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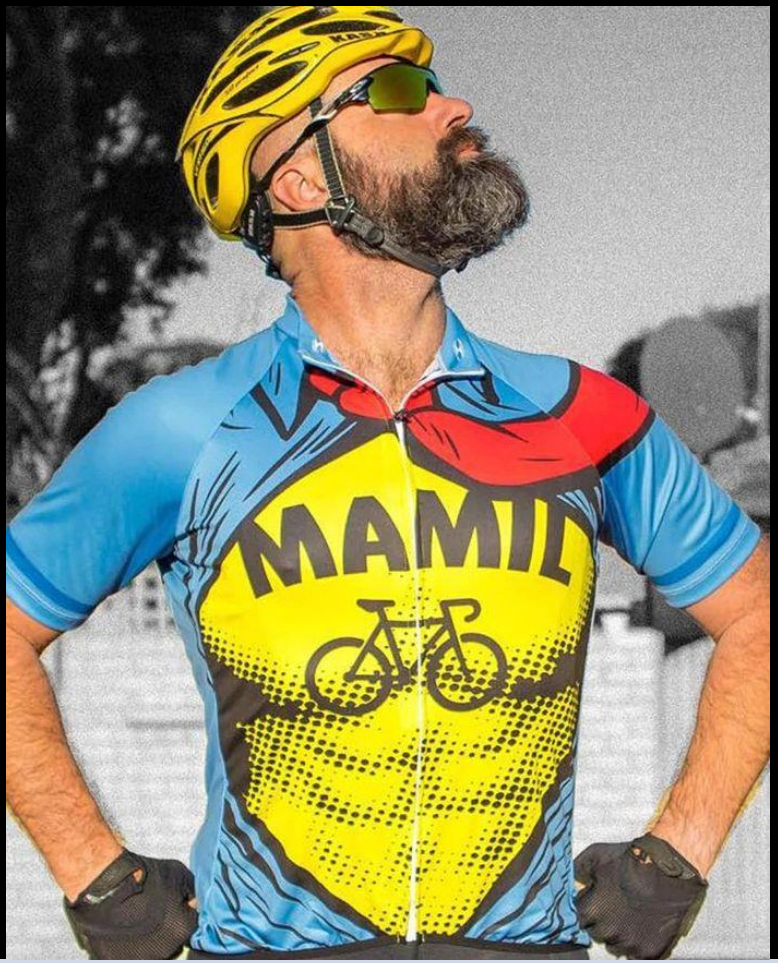
OM1

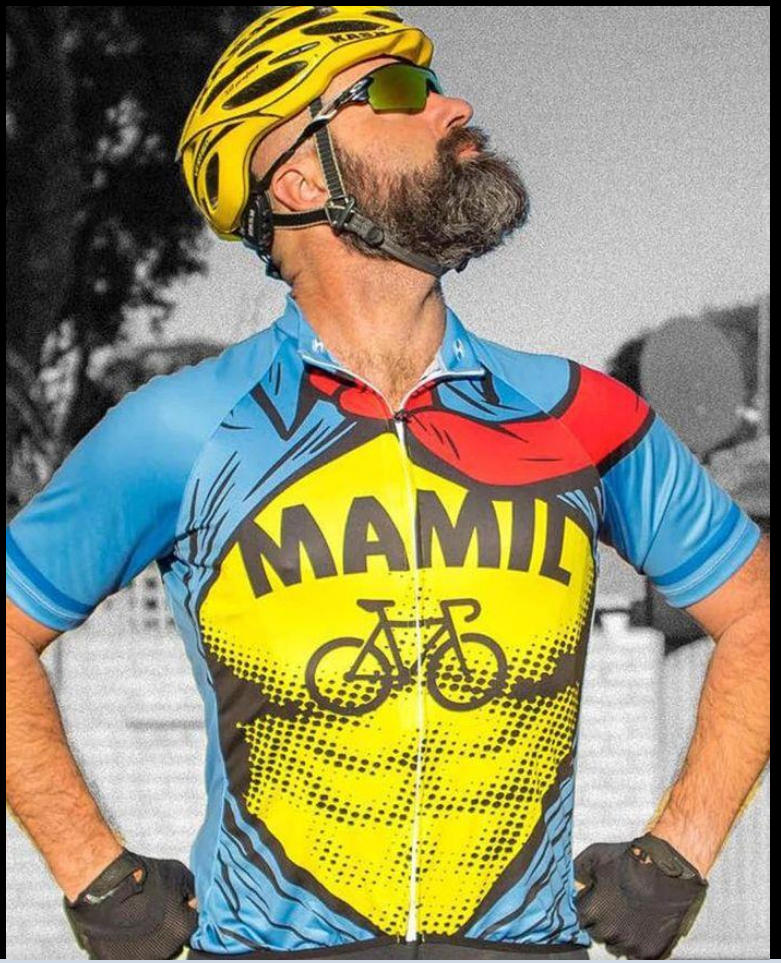
CASES

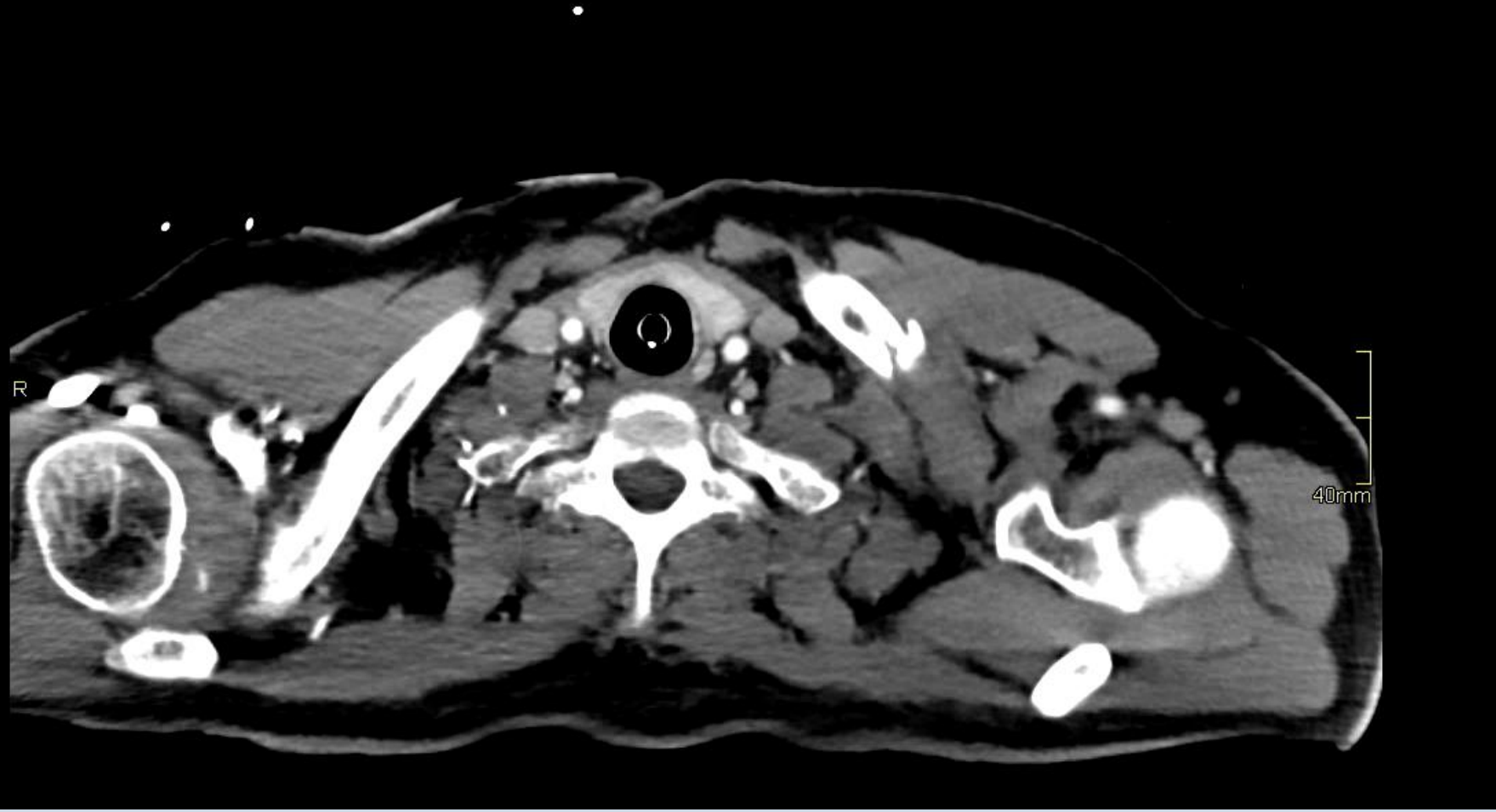
♂ 67 yrs accident bicylce



- Raise hand: who is a cyclist?
- Arm down: other sport?

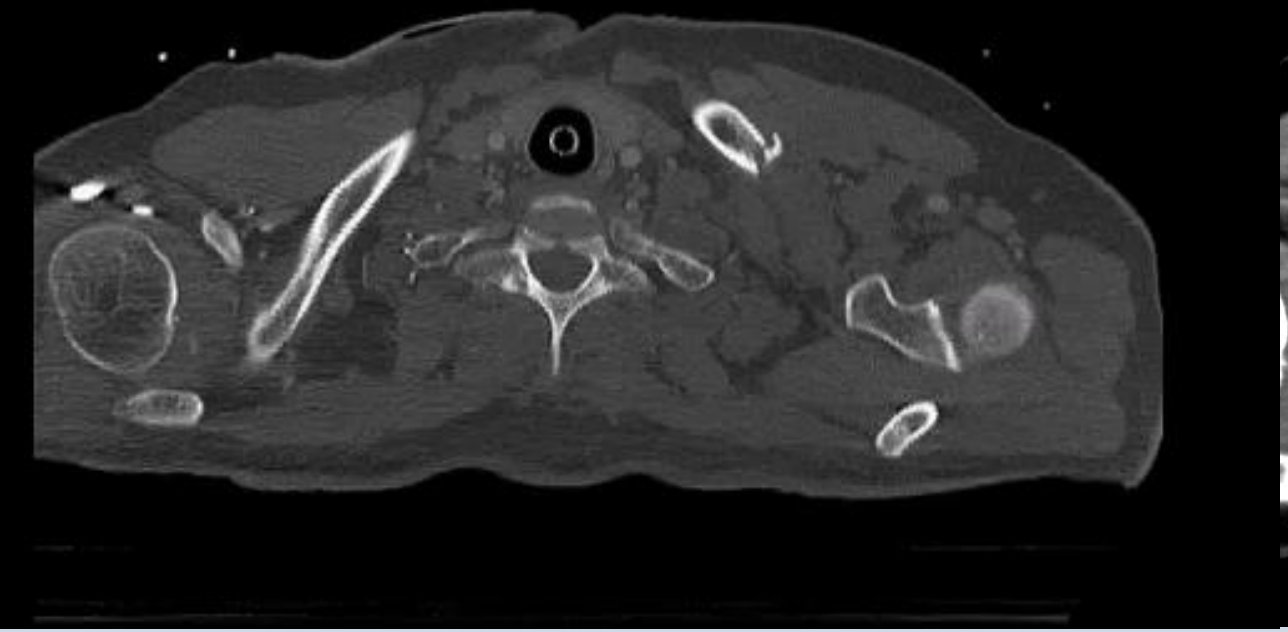
♂ 67 yrs accident bicylce



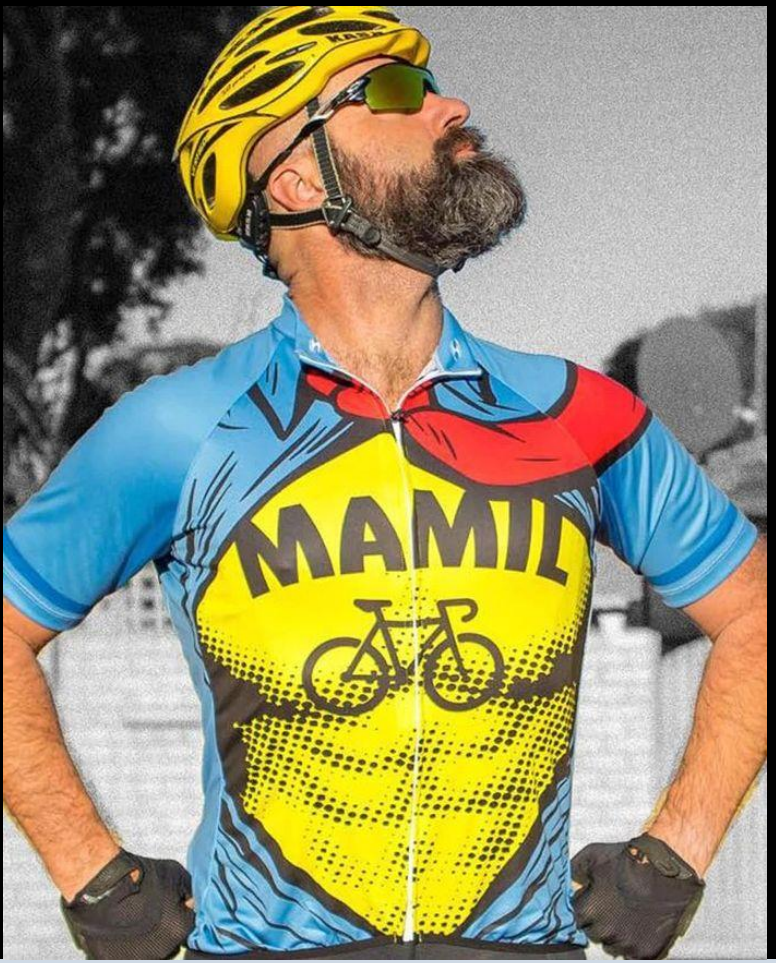


♂ 67 yrs accident bicylce

Raise hand: coronary
Hand down: next time avoid the pole



♂ 67 yrs accident bicylce



A: ET +

B: Pneumothorax –

Pleural effusion +

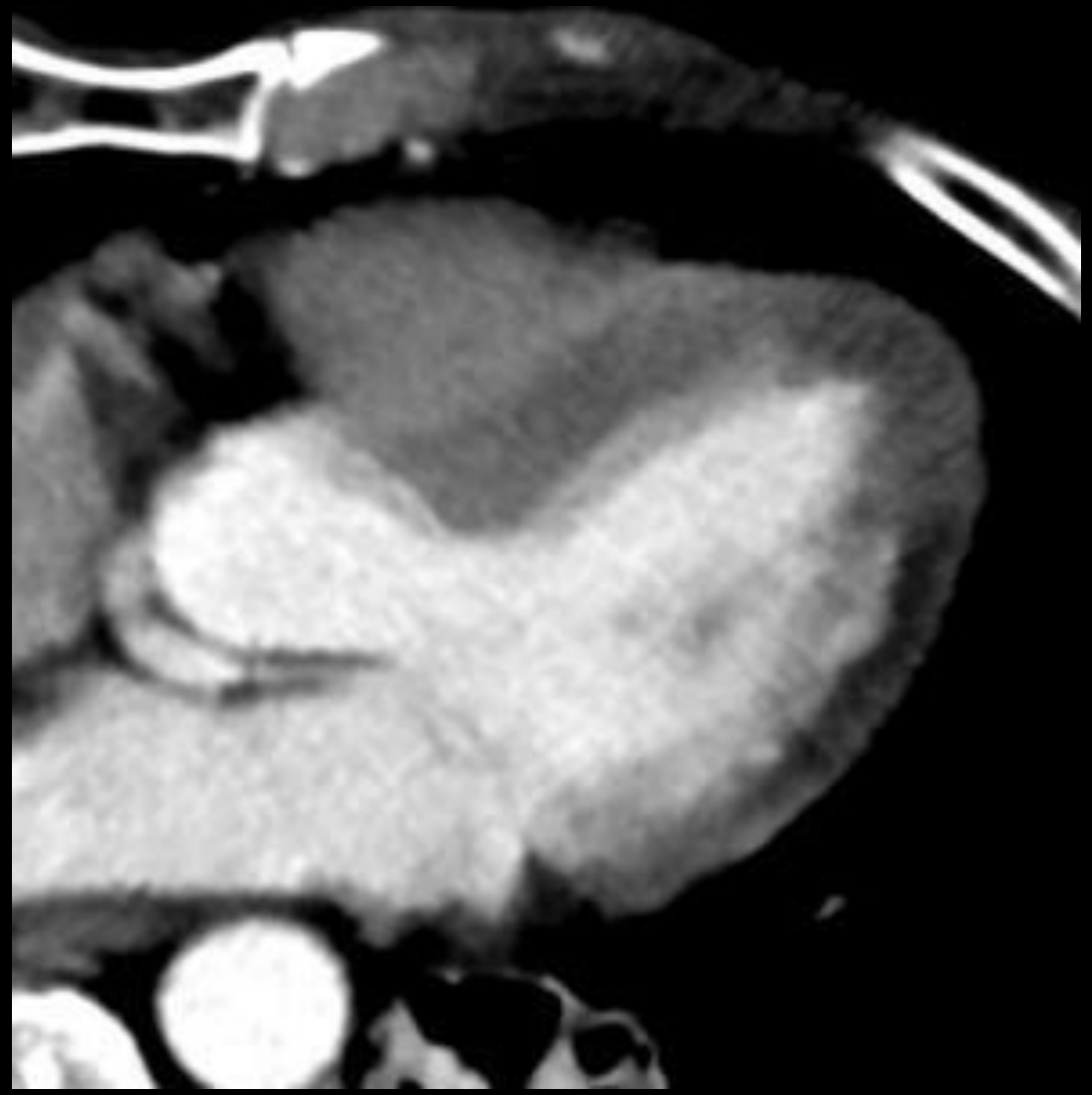
Lungcontusion –

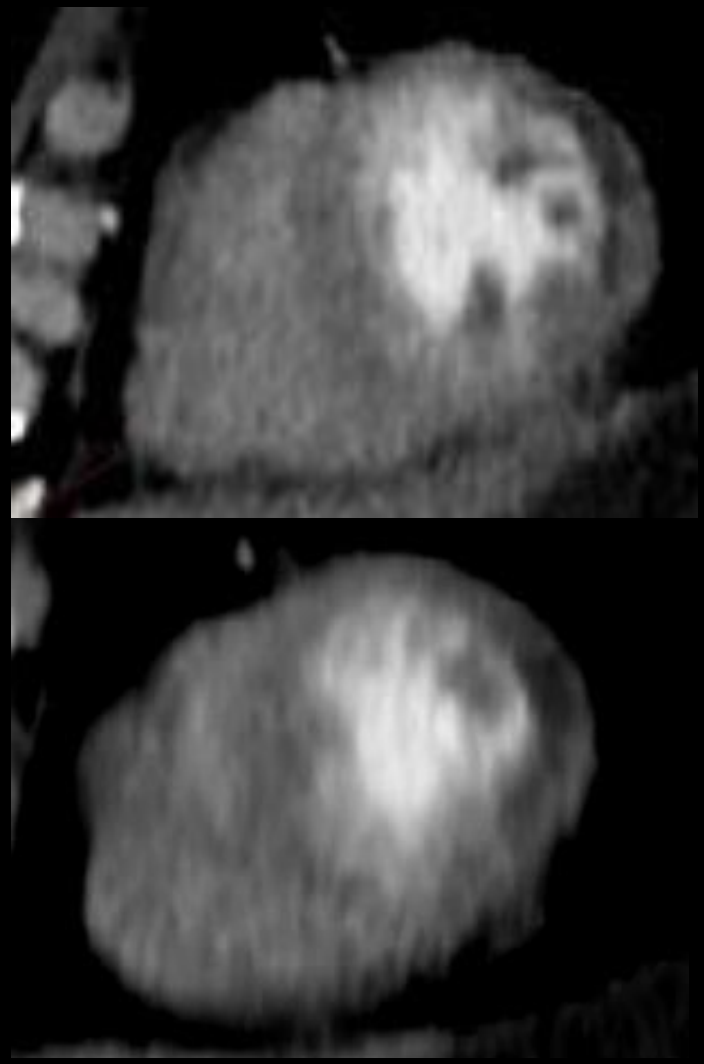
Multiple bilat costa # (fladder) left

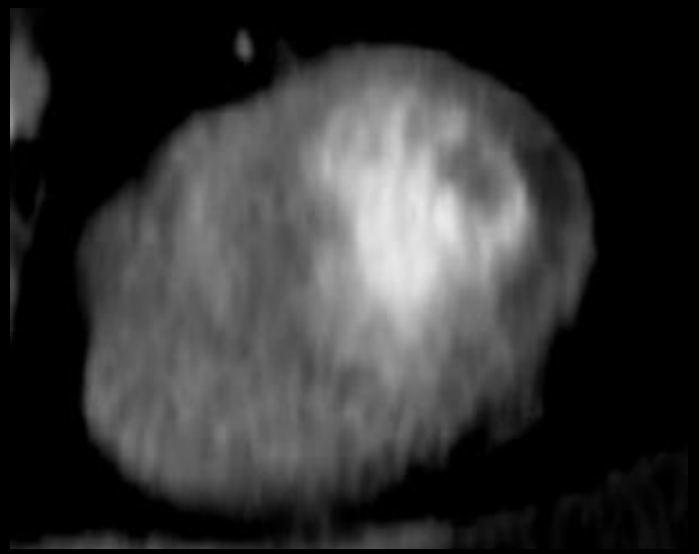
C: Ctr extravasation –

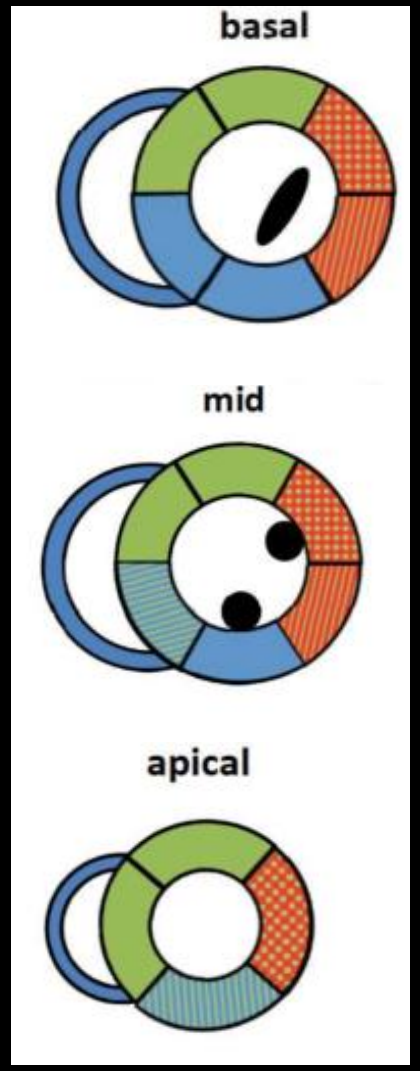
D: Intracranial hemmoraghe -

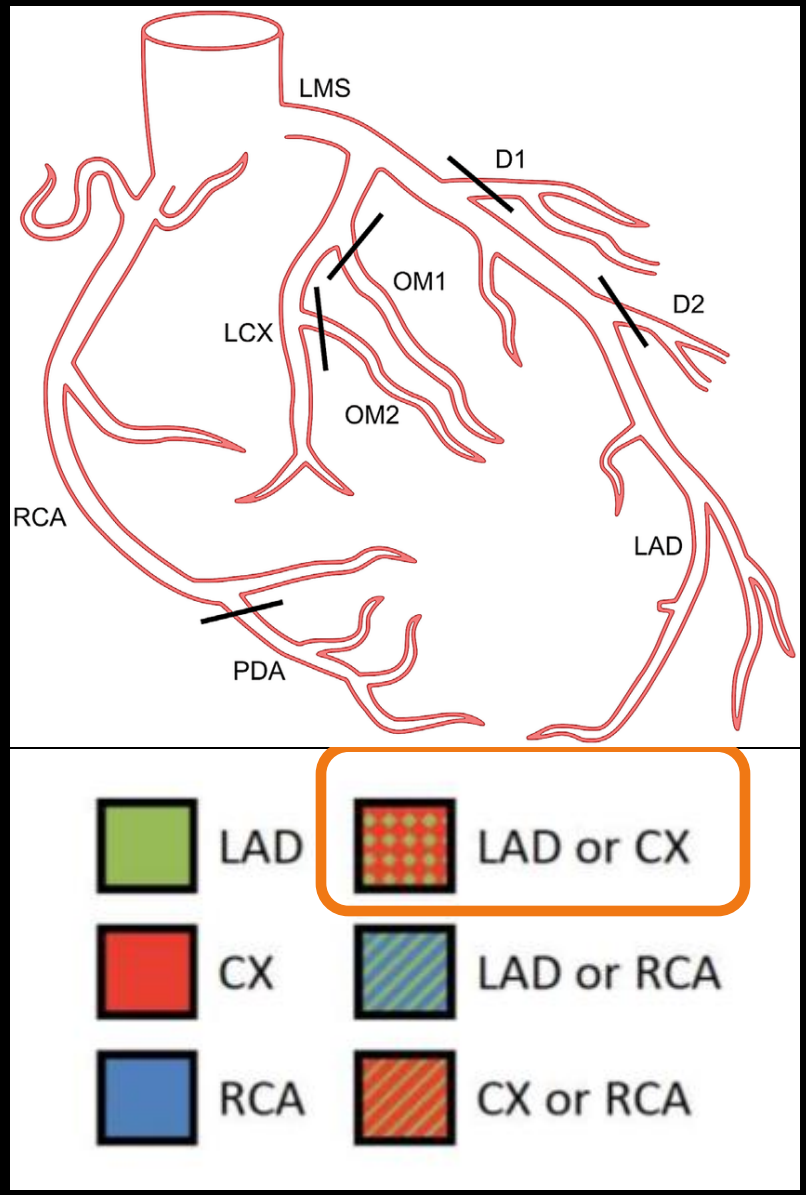
E: Clavicle # left







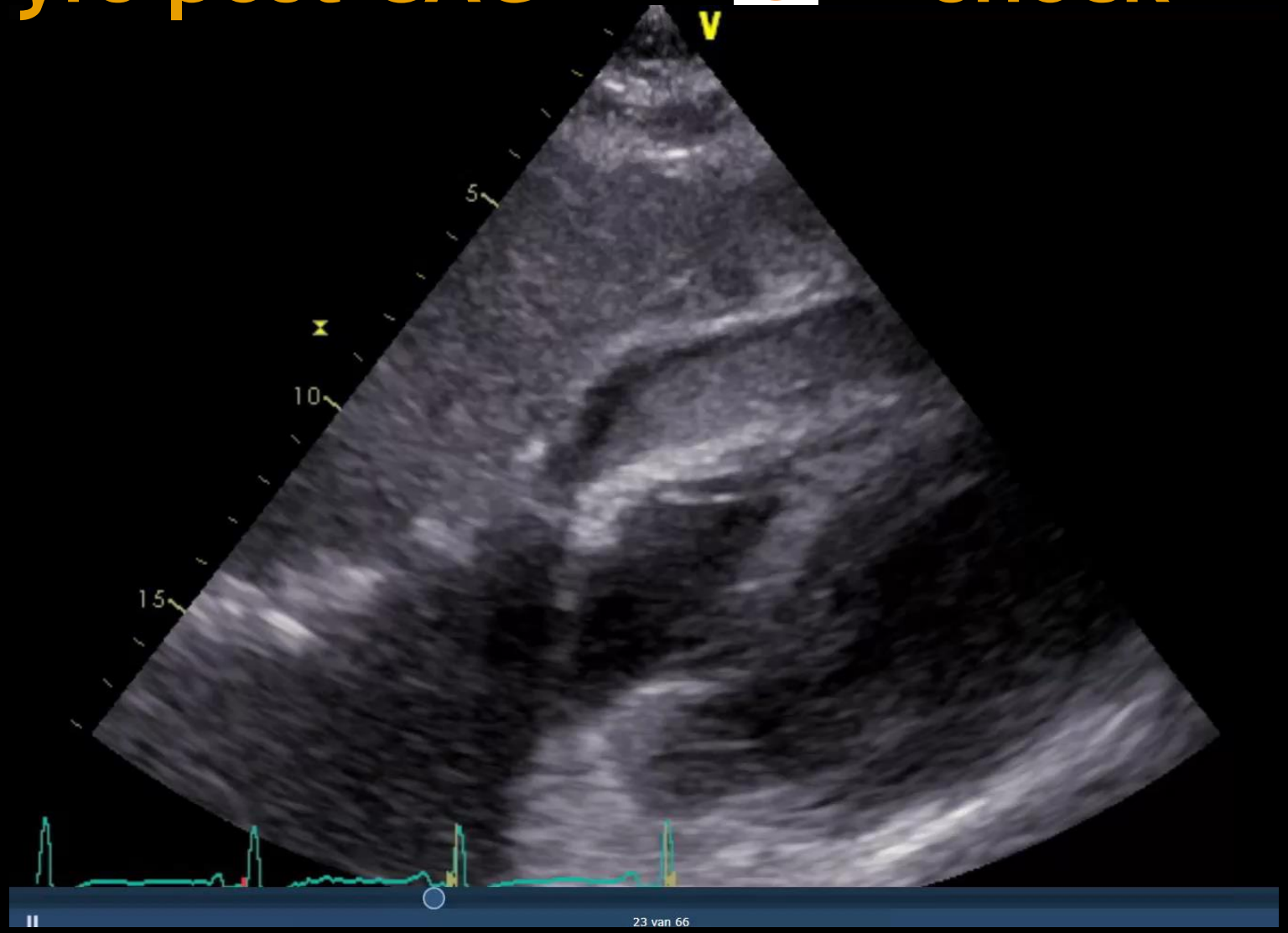

basal
mid
apical


LMS
D1
OM1
D2
LCX
OM2
RCA
LAD
PDA
LAD
LAD or CX
CX
LAD or RCA
RCA
CX or RCA

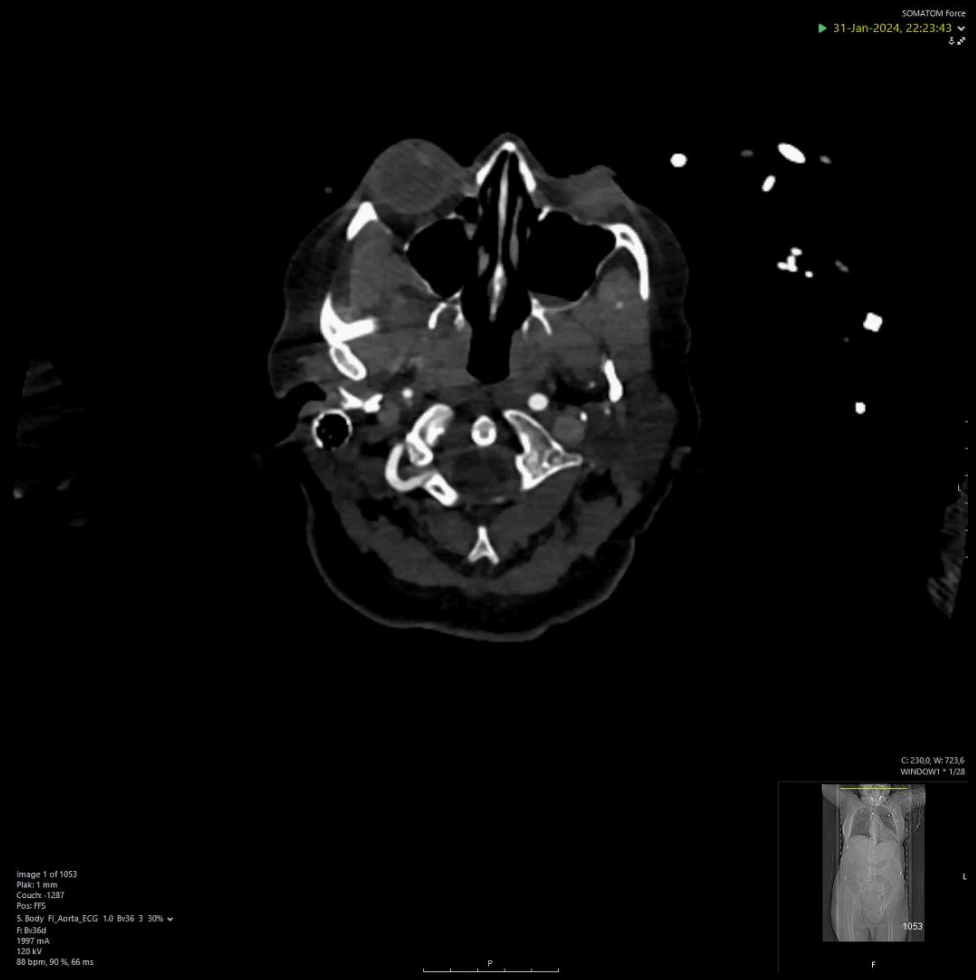
Male 67 yrs; accident bicylce

Myocardial infarct cause of accident
Stenosis intermediar →PCI

♀ 50 yrs post CAG shock

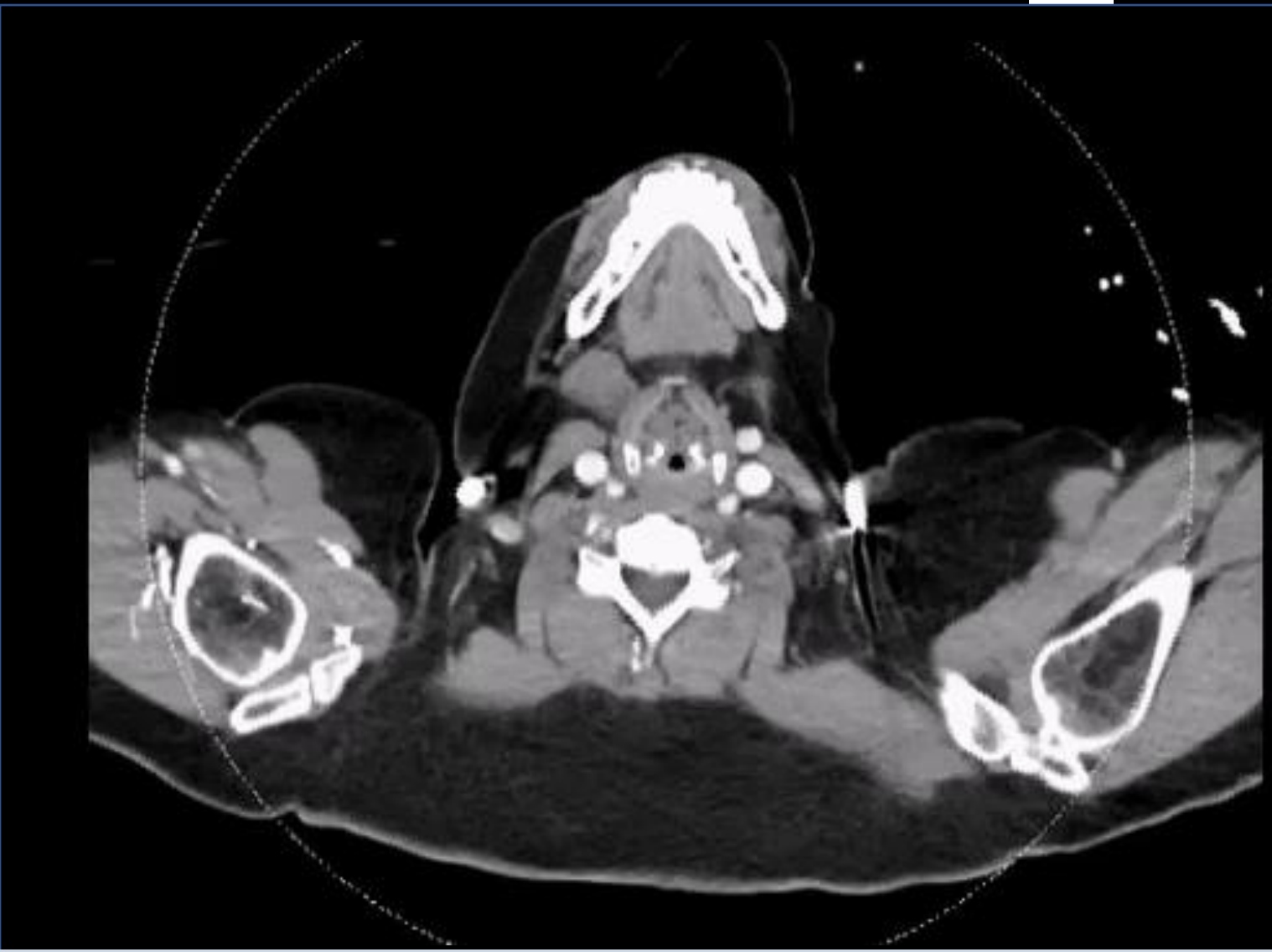


♀ 50 yrs post CAG shock



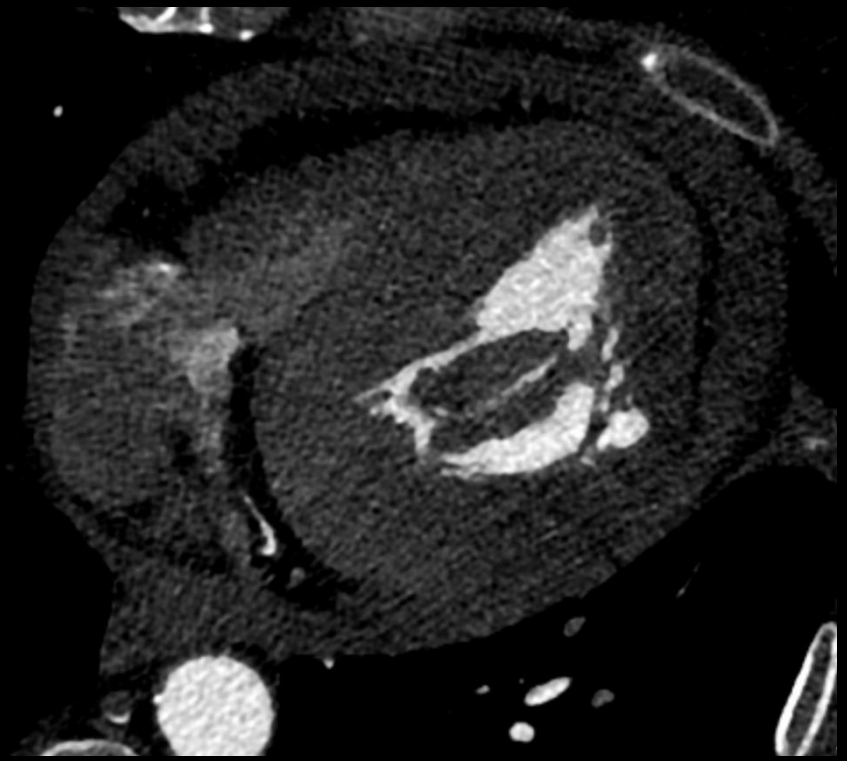
Dissection?

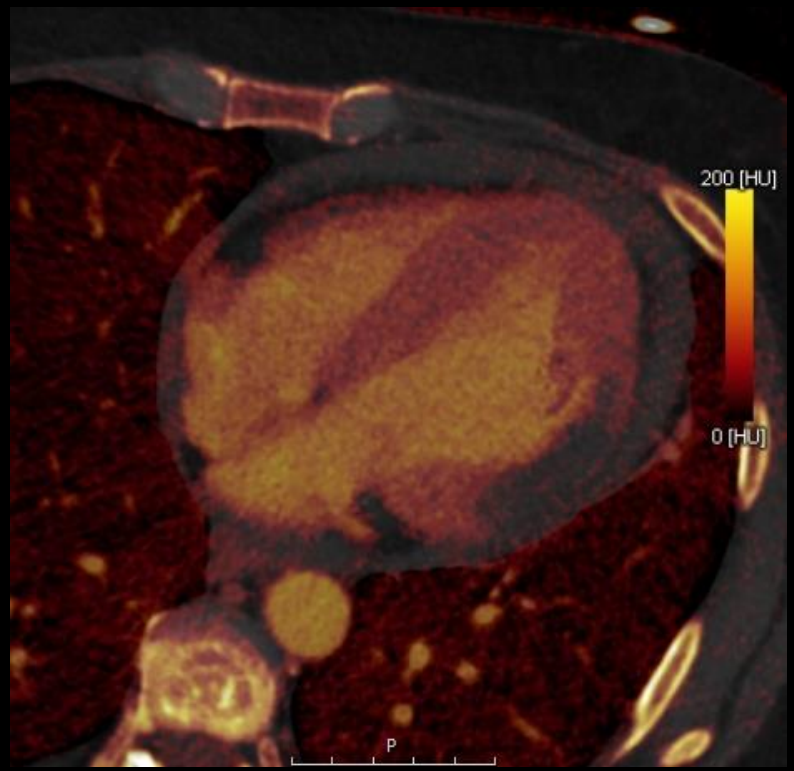
♀ 50 yrs post CAG shock

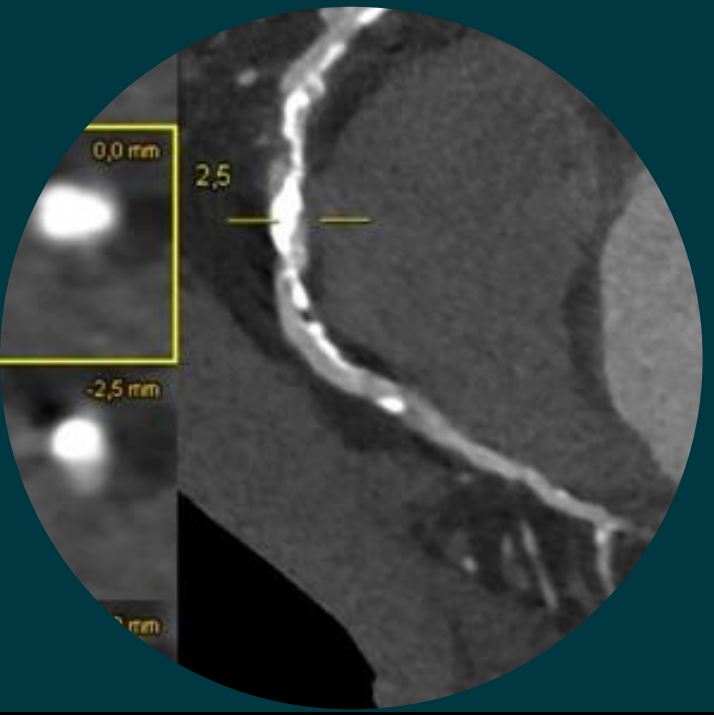


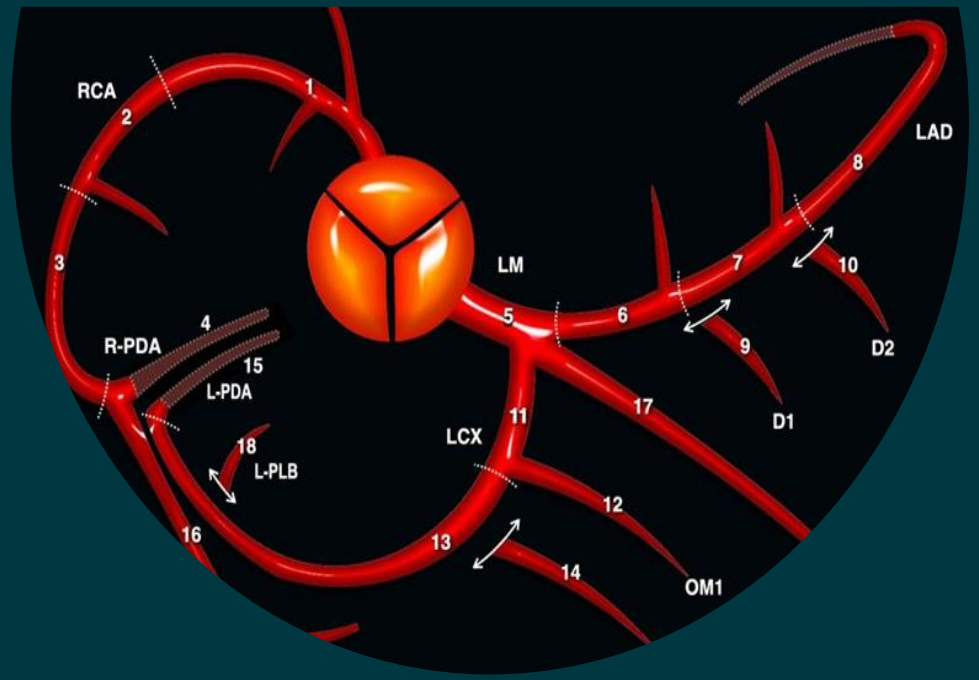
Tamponade, free wall rupture

♀ 50 yrs CAG shock






0,0 mm
2,5
-2,5 mm


RCA
1
2
3
LM
LAD
8
7
10
5
6
9
D2
4
R-PDA
15
L-PDA
11
17
D1
LCX
18
L-PLB
12
16
13
14
OM1

AORTA

Aorta

DDx

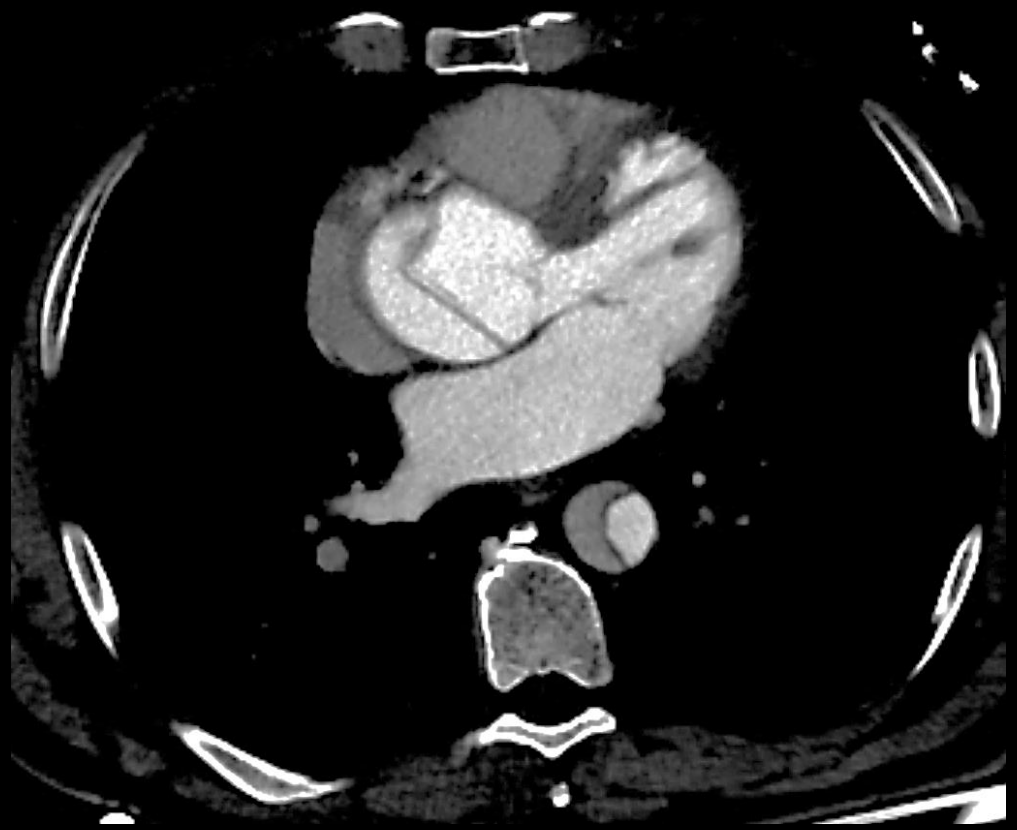
- IMH
- Dissection
- Miscellaneous

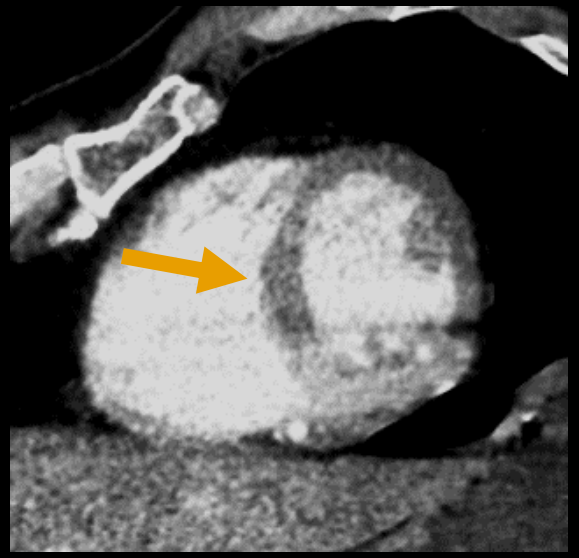
Acute aortic syndrome

Ascending aorta

Descending aorta

Major branches





Aorta dissection with LM obstruction

Take home messages

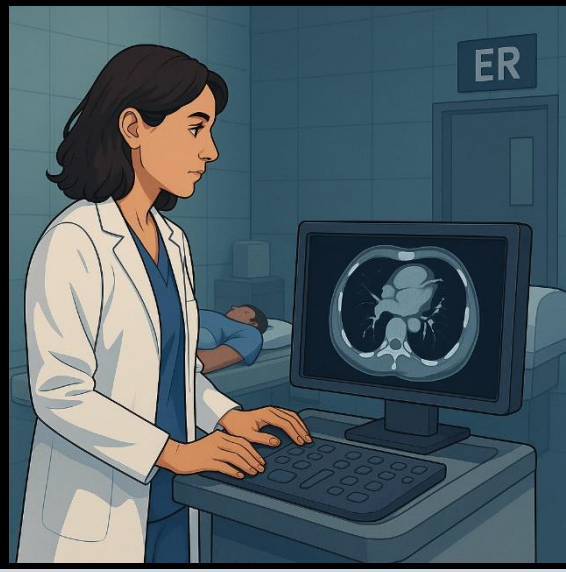
Chest pain ED:

Cardiac - otherwise - “accidental”

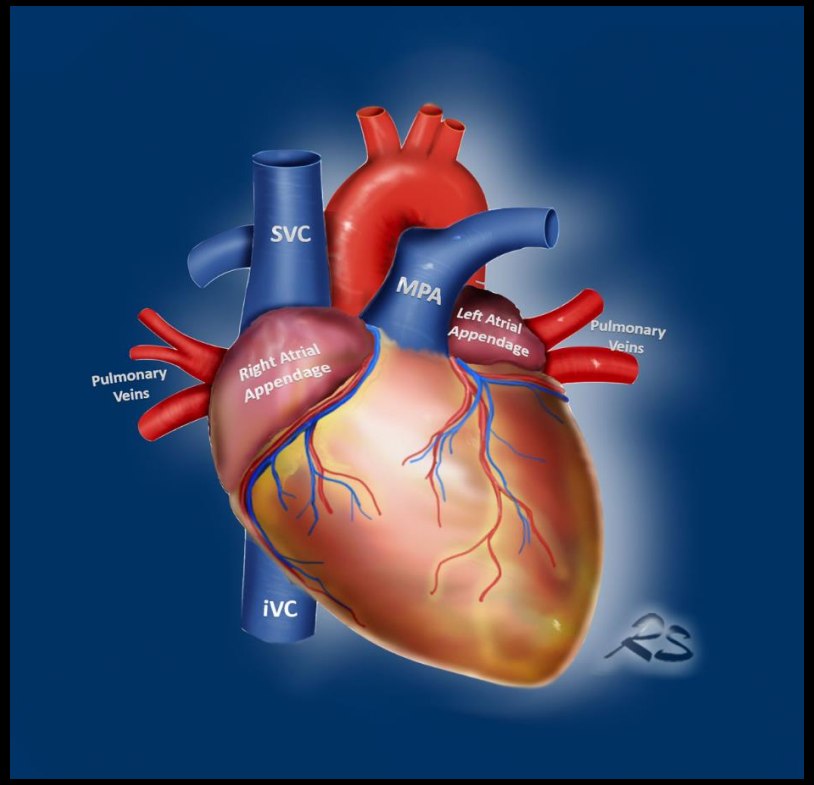
Coronaries: anatomy, cad rads, go with the flow!

The heart often surprises - Seeing the unseen

THINK OF THE HEART

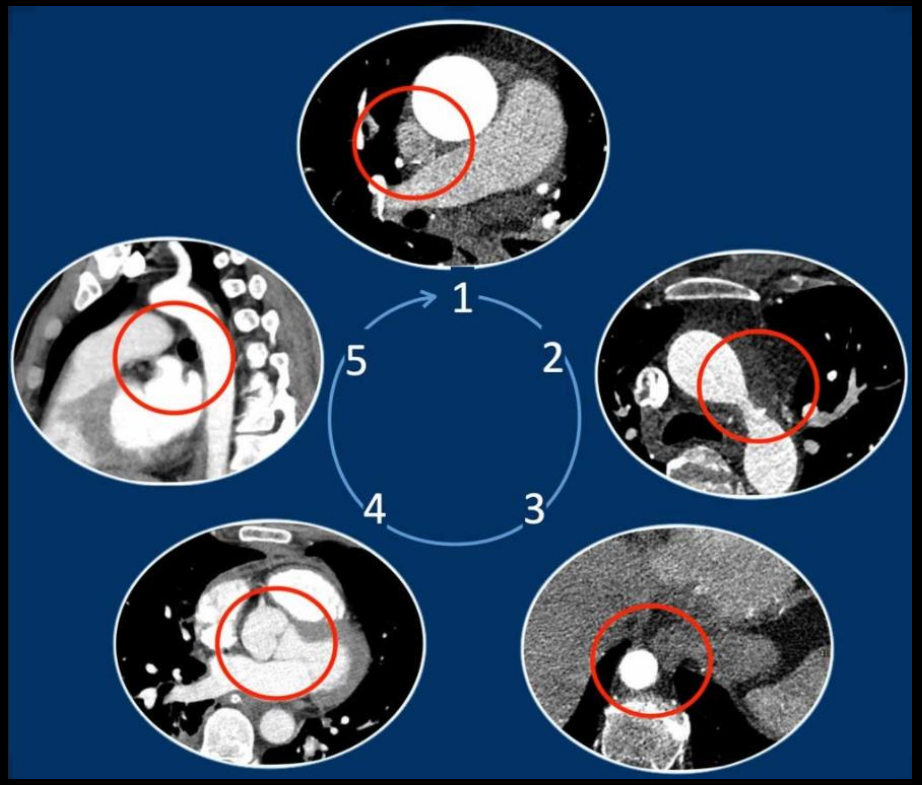


How I do it - Cardiovascular CT



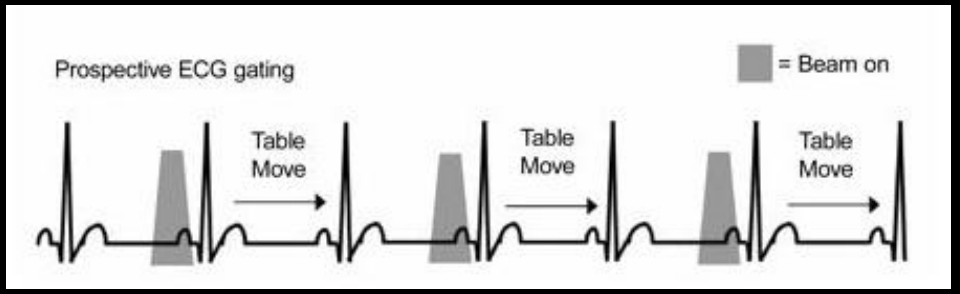
Follow the flow

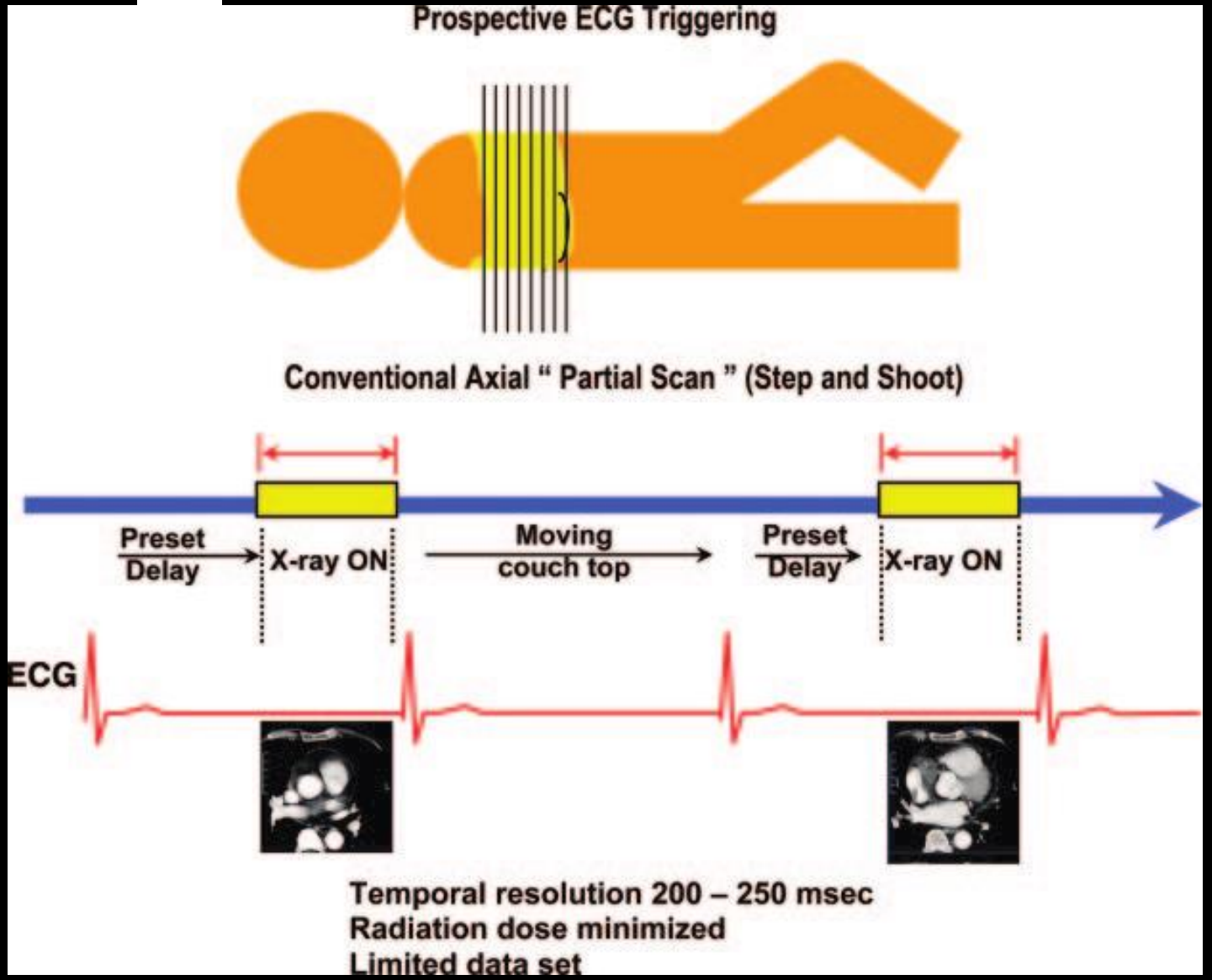
Five step approach



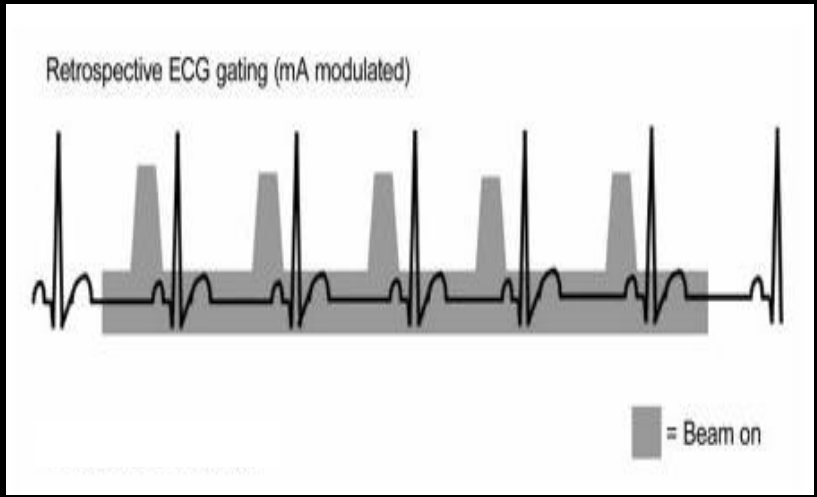
Many thanks to O. Mets and A. van Randen

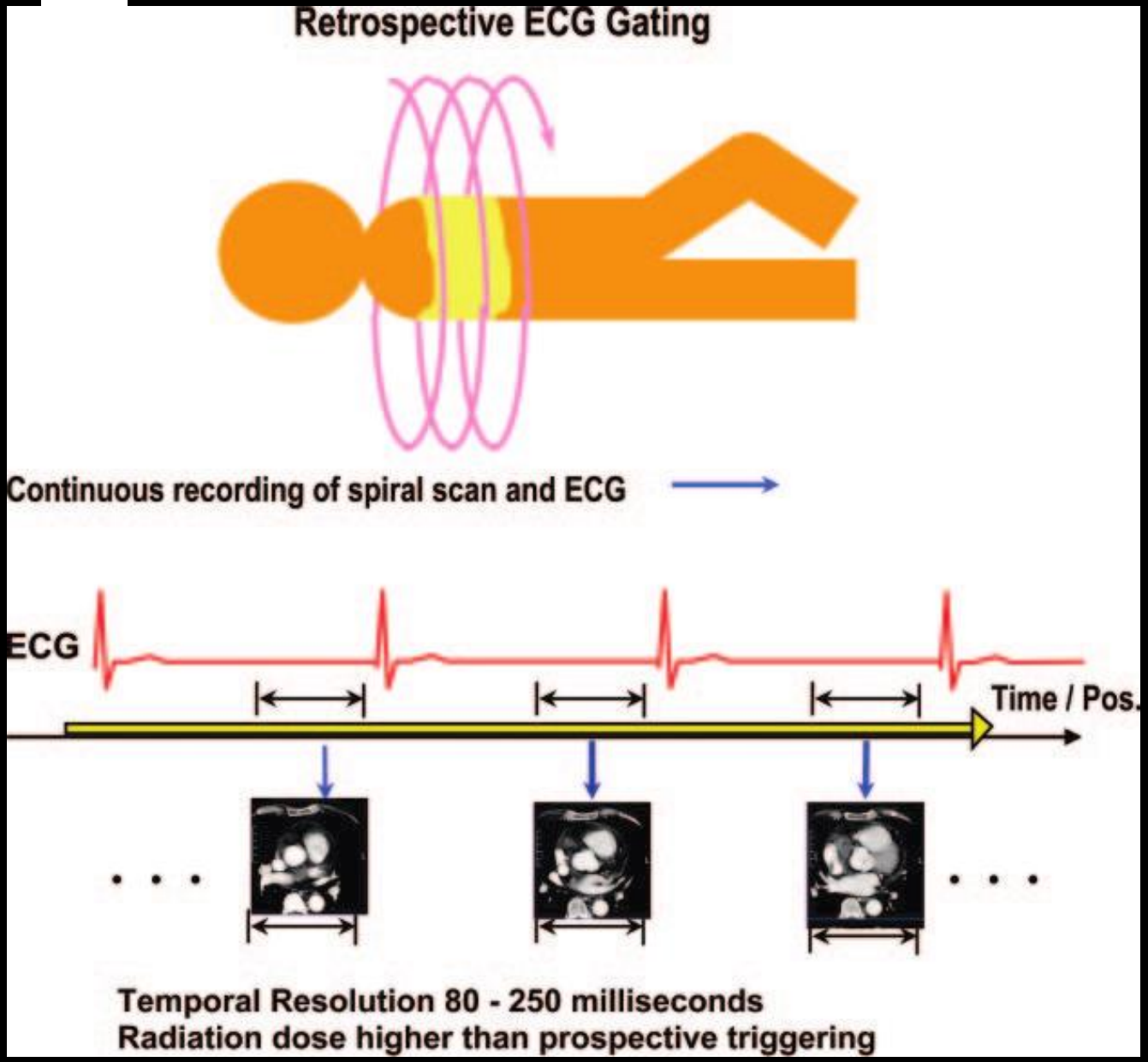
Prospectief triggering





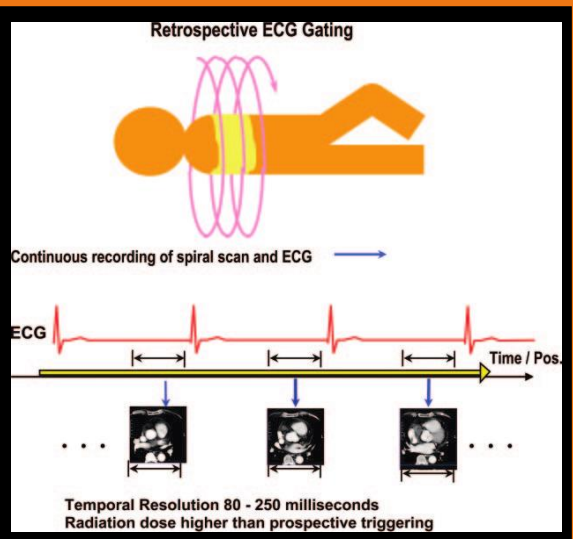
Retrospectief gating



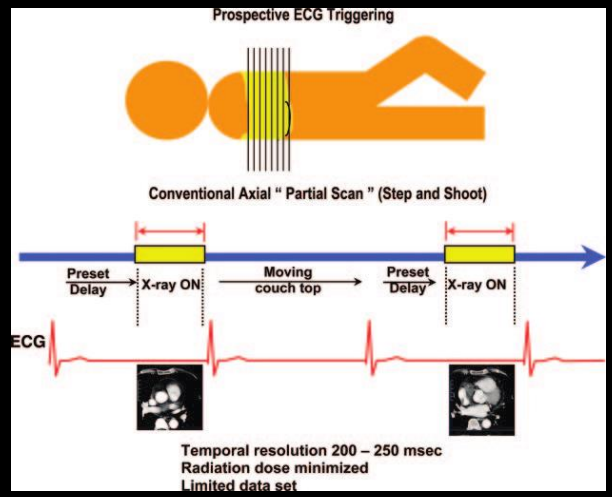


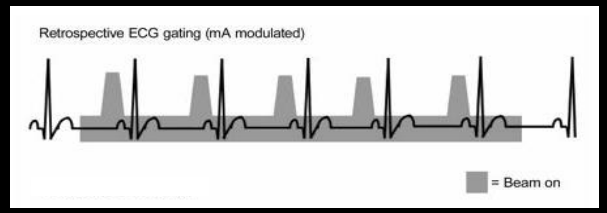
Prospectief triggering 2.0

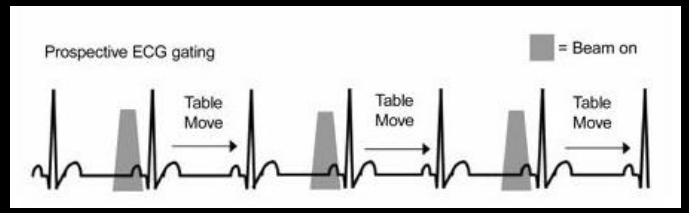
Retrospectief gating



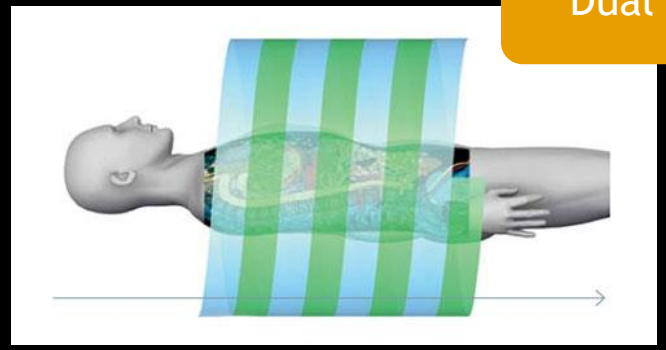
Prospectief triggering

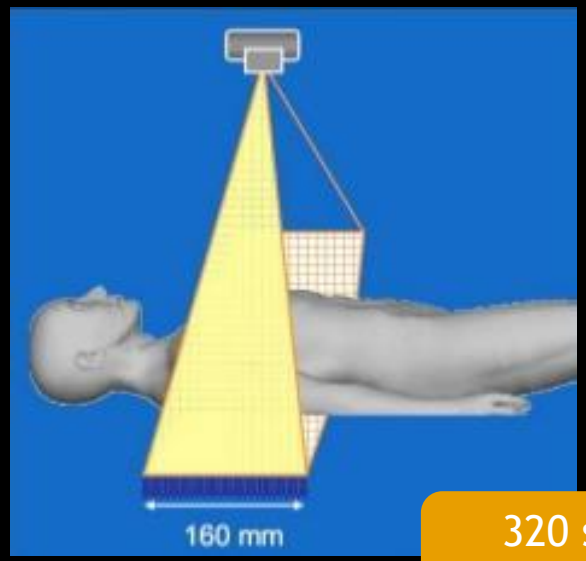






Dual source high pitch





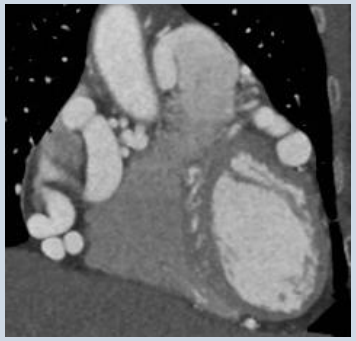
320 slice detectoren
(whole heart coverage)

Scan protocol – AUMC TRO-CTA

(Third generation dual source CT)

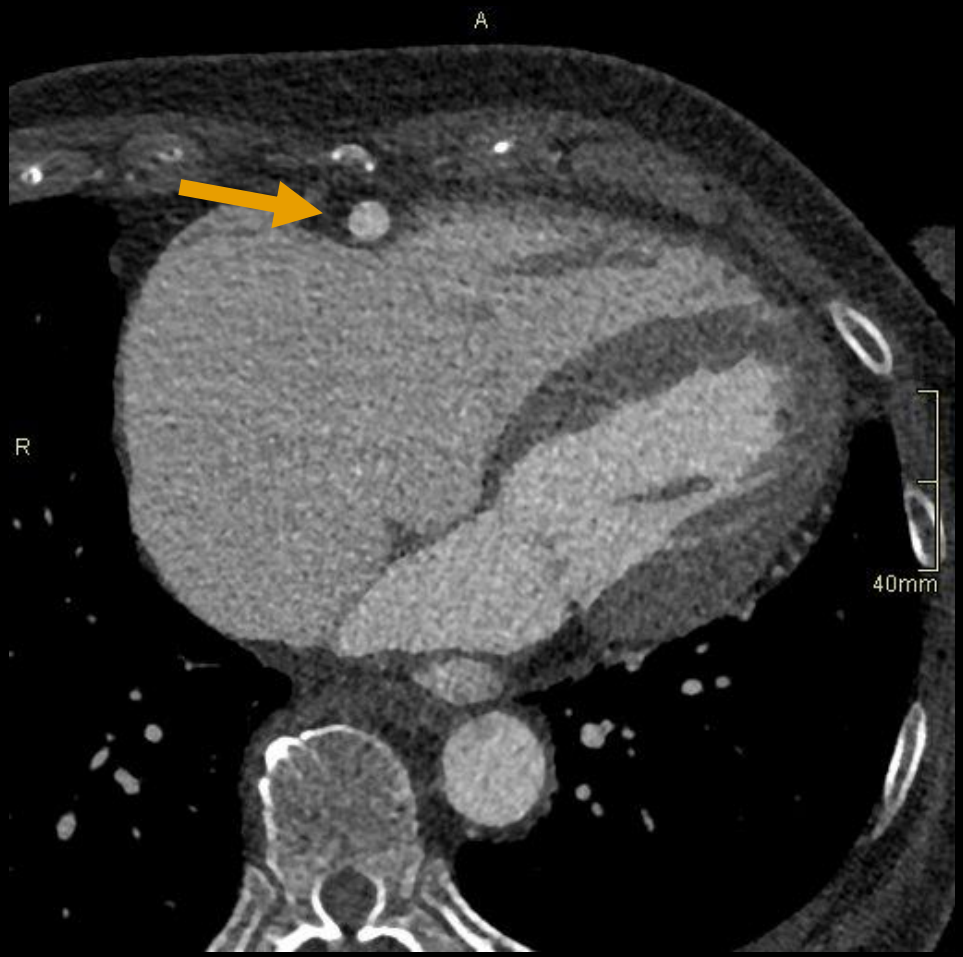
	Unenhanced	Arterial	Venous (DE)
Contrast	-	5 ml/s (≥70 ml)	
Ref kV	110	100	100/Sn150
Ref mass	50	290	190/95
Pitch	1.2	3.2	0.6
Rotation	0.5	0.25	0.5
Direction	Cra-Cau	Cra-Cau	Cra-Cau

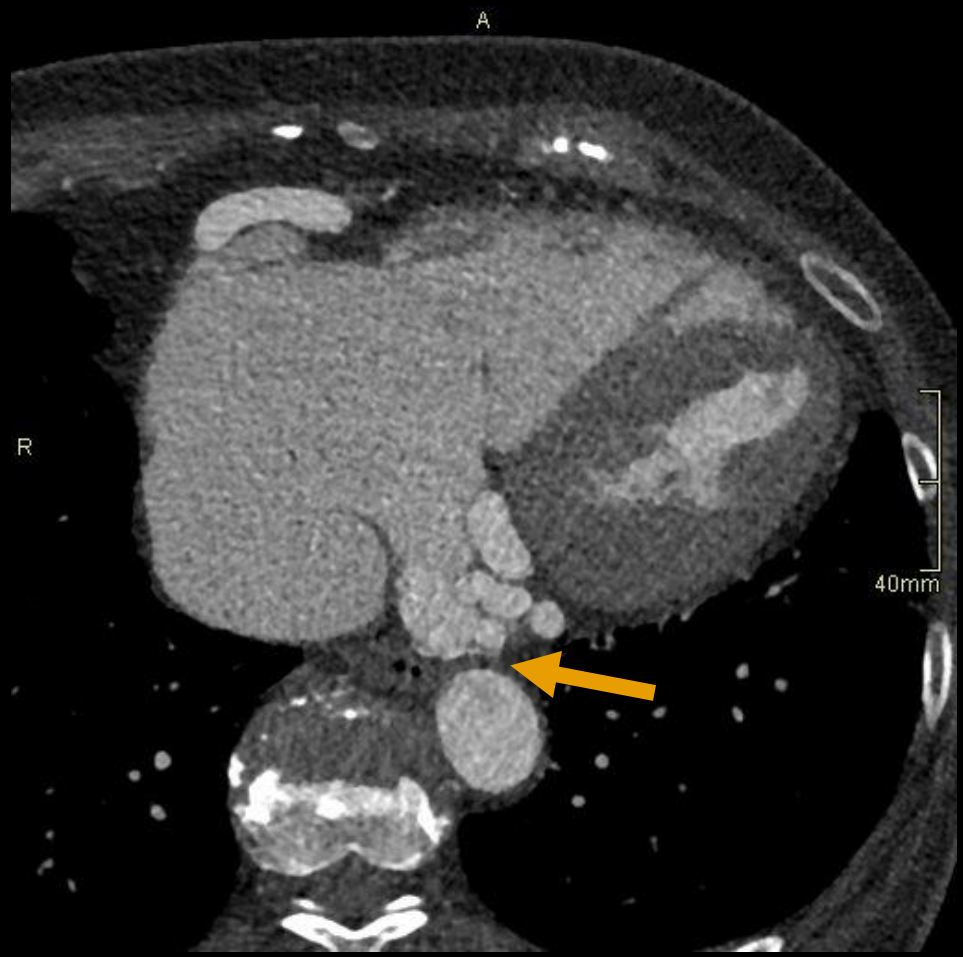
Miscellaneous



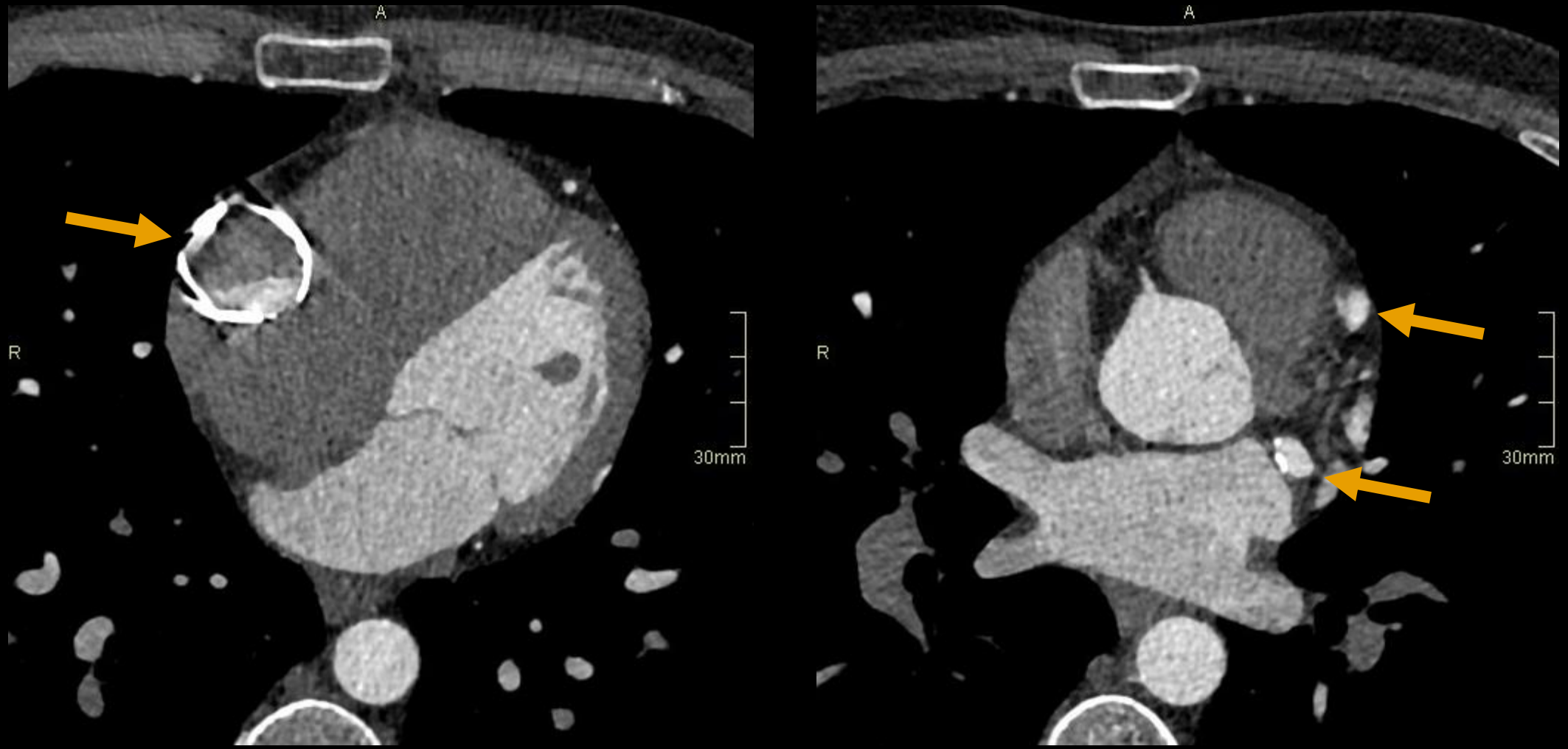
DDx
- Anomaly
- Atherosclerosis
- SCAD
- Miscellaneous

Coronary fistula	*Course* *Drainage site*
Aneurysm	DD M. Kawasaki / vasculitis DD Atherosclerotic
Other	*Various*

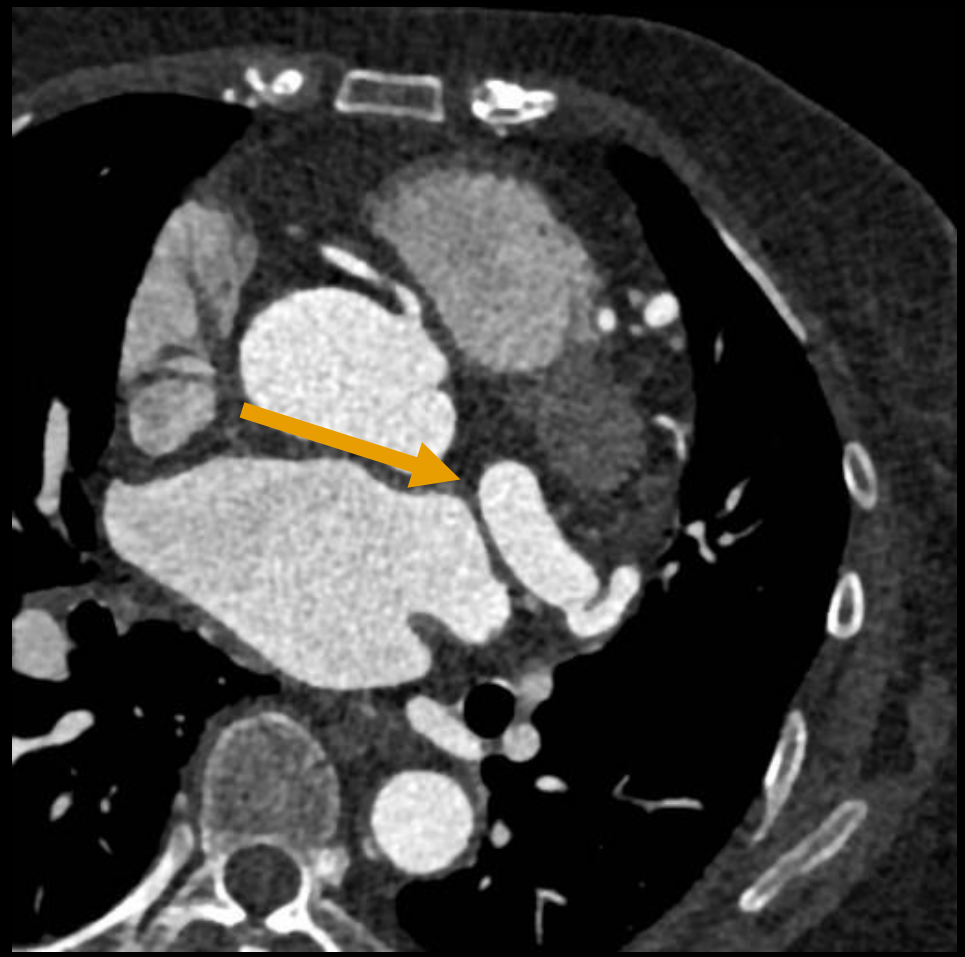




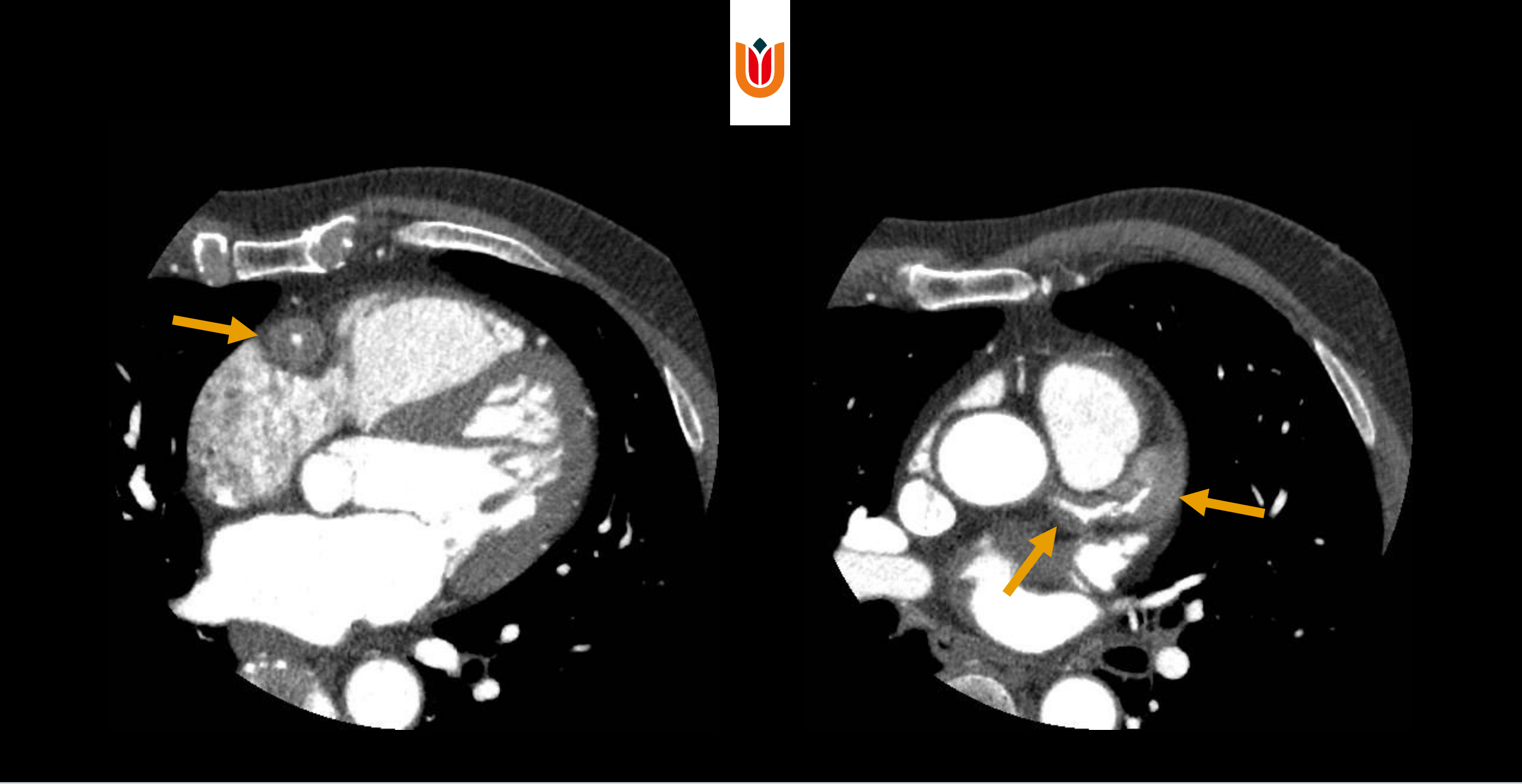
F69 - Chest pain. Coronary fistula between RCA ➔ coronary sinus



M37 - Chest pain. (Giant) coronary aneurysms due to M. Kawasaki



F79 - SLE - LCX aneurysm due to WD atherosclerosis

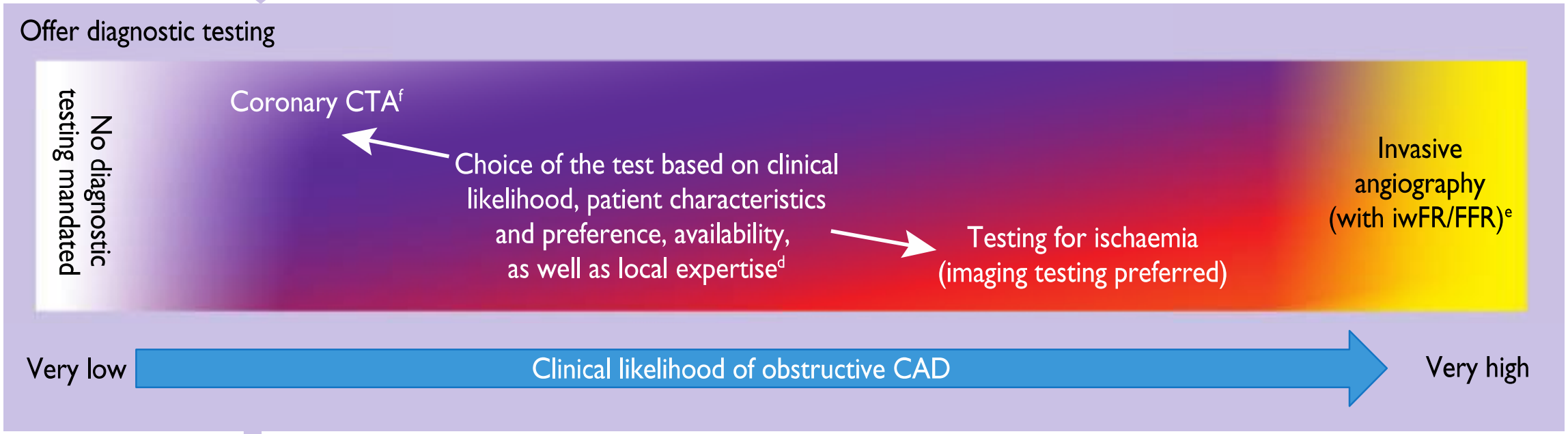


M64 - IgG4 disease with coronary (peri)arteritis

Amsterdam UMC
University Medical Centers

Thank you!

	Typical		Atypical		Non-anginal		Dyspnoea[a]	
Age	Men	Women	Men	Women	Men	Women	Men	Women
30–39	3%	5%	4%	3%	1%	1%	0%	3%
40–49	22%	10%	10%	4%	3%	2%	12%	3%



STEP 3 patients, echocardiography at rest[b] → LVEF <50% → See section 4

STEP 4 Assess pre-test probability and clinical likelihood of CAD[c] → Cause of chest pain other than CAD? → Treat as appropriate or investigate other causes

Atypical angina	Meets two of these characteristics.
Non-anginal chest pain	Meets only one or none of these characteristics.