

# Cardiac CT in an office/outpatient setting – How to make it successful

Fri July 28<sup>th</sup>, 2023  
7am – 7:50 am EST








**CardioGraphe**  
Dedicated Cardiovascular CT System



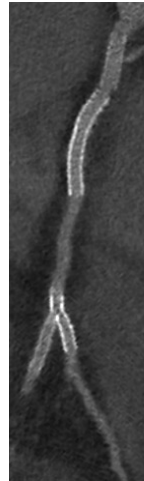
# Cardiac CT in an office/outpatient setting – How to make it successful

## Agenda

Topic	Speaker	Title	
Introduction	Scott Schubert	CEO, Arineta	
Clinical applications of office-based cardiac CT	Sujith Kalathiveetil MD, FACC	Director of Advanced Imaging, Section of Cardiology, Duly Health and Care	
Cardiac CT in an office/outpatient setting – How to make it successful	Kyle M. Brownell, BS, CNMT, NMTCB(CT)	Assistant Director of Operations, Capital Cardiology Associates	 
	Jennifer Espey, L.R.T (CT)	CT Manager, Capital Cardiology Associates	
Cardiac CT Economics – Breaking down the myths	Ginger Biesbrock DSc, PA-C, FACC	Executive Vice President, Care Transformation Services, MedAxiom	
Q&A			

# Arineta Vision

Dedicated to growing cardiac CT as the front-line non-invasive test for diagnosing, therapy planning & monitoring of cardiovascular disease  
... the #1 cause of death and costs for healthcare worldwide

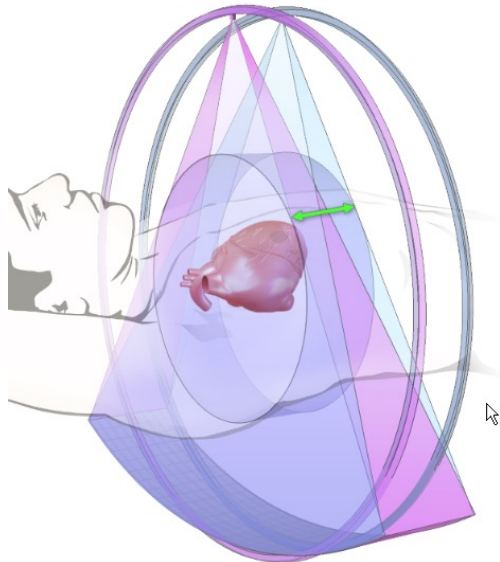


# CardioGraphe:

## The highest performance cardiovascular CT

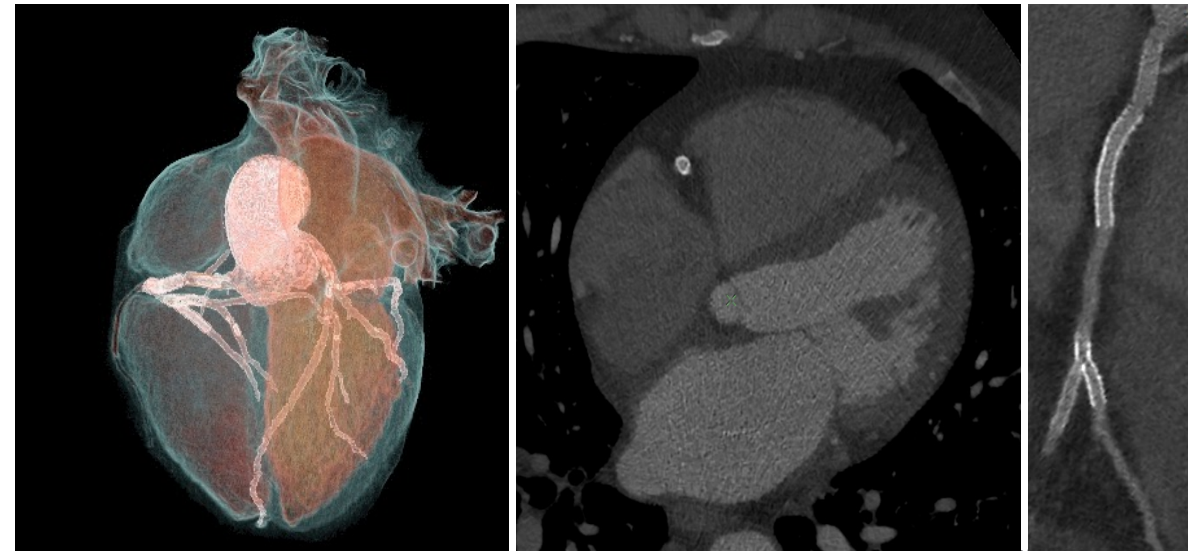
### Technical Specs

- 0.24sec rot speed, 120msec temporal resolution
- 14cm whole heart coverage, 560 slices
- High res: 0.5mm detector, HD mode, Stereo CT
- 139kW effective power for SNR
- Novel Stereo CT design



### Clinical Performance




- CCTA: 1-beat, whole heart
- High BPM: arrhythmia mgmt, motion correction
- TAVR, PCI, Valve & interventional planning
- CTA vascular + Thoracic





# Cardiac CT in an office/outpatient setting – How to make it successful

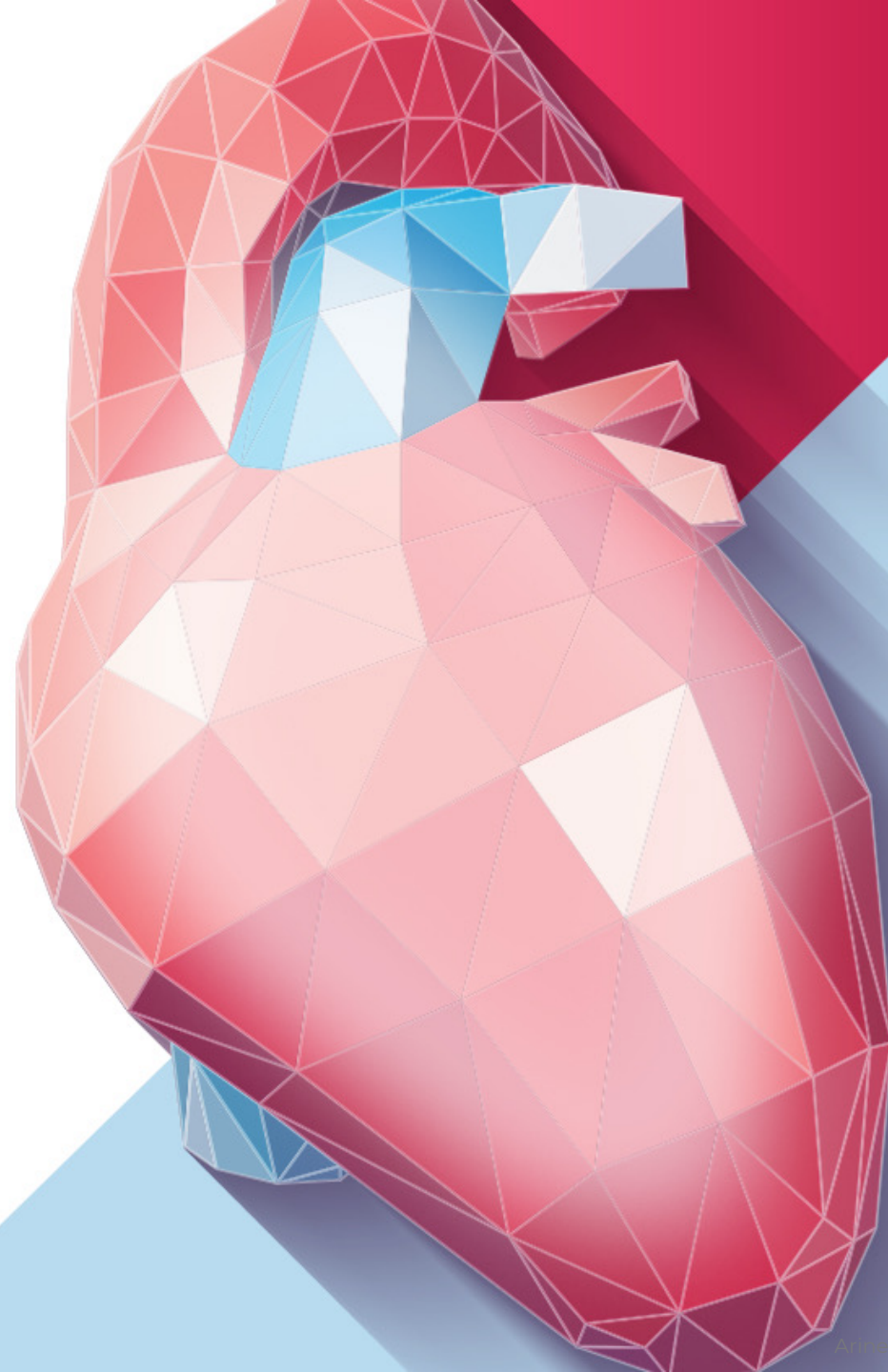
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Q&A			

# Clinical Applications of Office Based Cardiac CT

**Sujith Kalathiveetil MD FACC**

Director of Cardiac Imaging  
Section of Cardiology  
Duly Health and Care



# Duly Health and Care

- Private, physician-owned, multispecialty practice of 1,000 physicians, with approximately 50 cardiologists
- Range of services across primary and specialty care, serving over two-thirds of Chicagoland suburbs
- Duly core philosophy: provide high quality care that is outpatient based and cost-effective for maximum value (sizeable Medicare Advantage population)





# Introduction

- Chest pain particularly problematic
  - Triage nurses reflexively sent all patients with chest pain to local ERs where they were typically admitted for inpatient evaluation
  - Many of these patients did not have life-threatening chest pain; hospital admission unnecessary





# Introduction

- Duly created a **Cardiac Evaluation Center (CEC)** for patients with non-life-threatening cardiac symptoms (including chest pain) to provide:
  - Rapid evaluation
  - Onsite testing
- By providing expedited outpatient evaluation, our goals were to:
  - Reduce healthcare costs and
  - Provide greater patient satisfaction



CLINICAL PRACTICE GUIDELINE: FULL TEXT

# 2021 AHA/ACC/ASE/CHEST/SAEM/ SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain



A Report of the American College of Cardiology/American Heart Association  
Joint Committee on Clinical Practice Guidelines

## Writing Committee Members\*

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Debabrata Mukherjee, MD, MS, FACC, FAHA, *Vice Chair*<sup>†</sup>

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\*Writing committee members are required to recuse themselves from voting on sections to which their specific relationships with industry may apply; see [Appendix 1](#) for detailed information.

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<sup>§</sup>Society of Cardiovascular Computed Tomography Representative.

<sup>||</sup>Lay Patient Representative.

<sup>¶</sup>Society for Academic Emergency Medicine Representative.

<sup>#</sup>Former ACC/AHA Joint Committee member; current member during the writing effort.

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<sup>††</sup>American College of Chest Physicians Representative.

<sup>††</sup>American Society of Echocardiography Representative.

<sup>§§</sup>Task Force on Performance Measures, Liaison.

# Cardiac Evaluation Center (CEC)

- Coronary CTA (CCTA) is the only test with a **class I recommendation and level A evidence** for the diagnosis and management of stable chest pain in patients without prior obstructive CAD
- 2021 ACC/AHA chest pain guidelines made it clear acquiring a cardiac CT scanner was vital for our practice
- Duly purchased a Arineta/GE CardioGraphe™ CT scanner and opened the CEC in January 2022



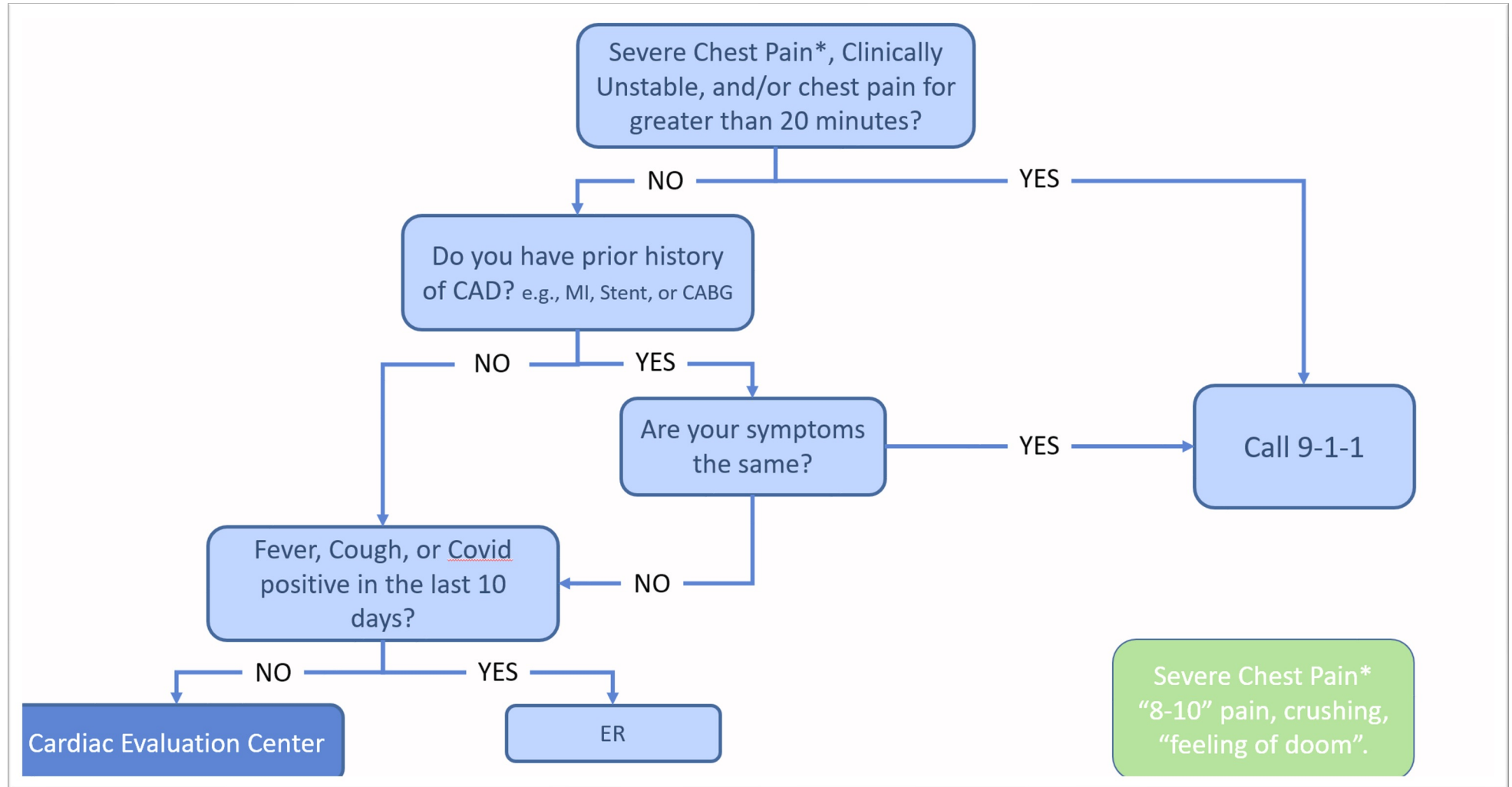
# Cardiac Evaluation Center (CEC)

- The Arineta/GE CardioGraphe CT scanner was chosen for a variety of reasons:
  - Smaller form factor is space-efficient (great for ambulatory setting)
  - Smaller field-of-view (FOV) reduces radiation dose and limits visualization of noncardiac anatomy (dedicated cardiac CT)
  - Cost-efficient as compared to larger detector scanners
  - Provides excellent image quality





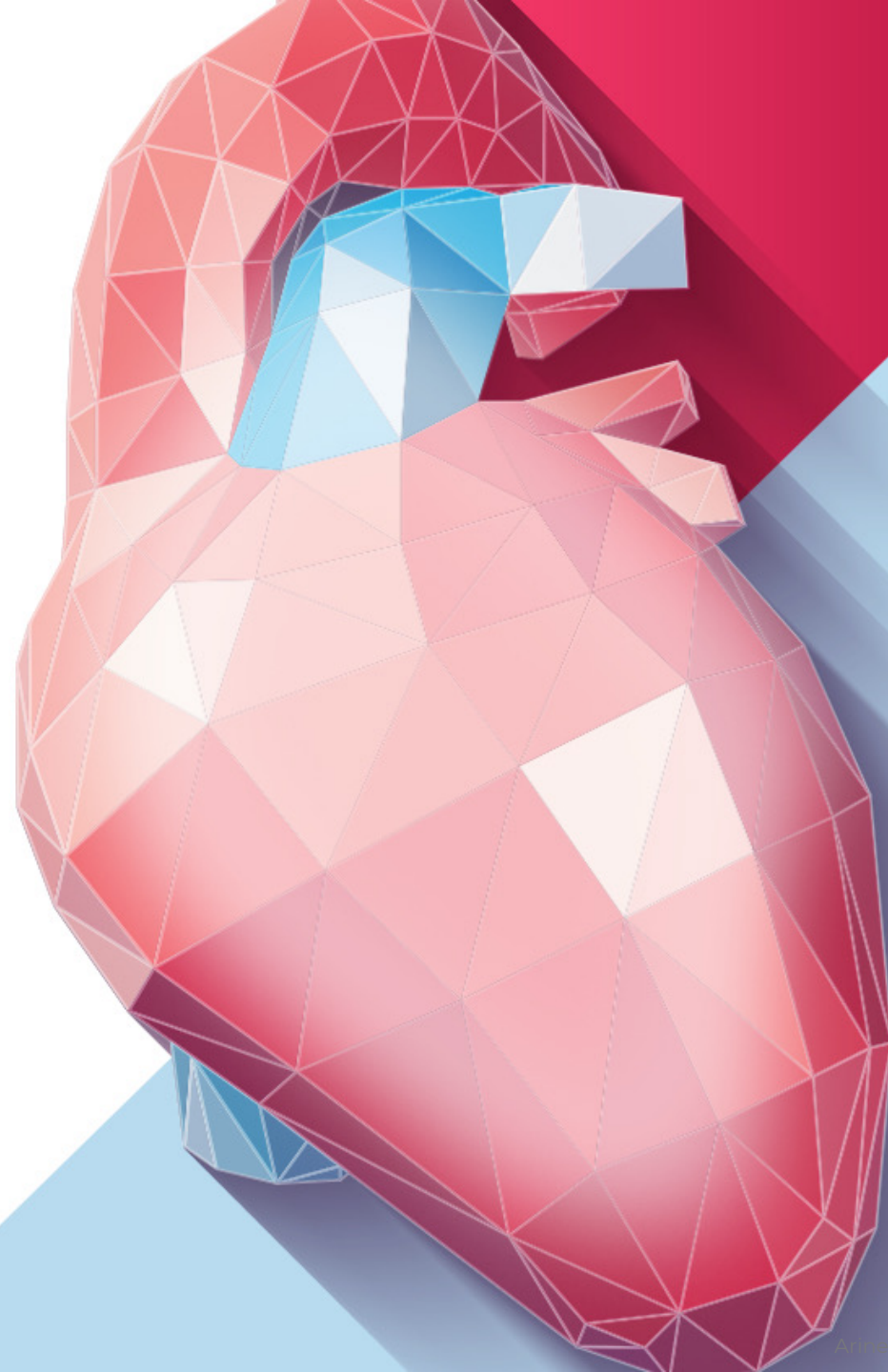
# Duly chest pain guideline for CEC



# Cardiac Evaluation Center (CEC)

- Open Monday – Friday, 8 AM-5 PM
- 12 elective outpatient CTAs are scheduled daily
  - Coronaries, pulmonary veins/LAA, valves, thoracic aorta
- 5 CTA additional slots reserved for daily “walk-in” CCTAs
  - 2-3 walk-in CTAs are typical
- 14-22 patients seen daily at CEC; 7142 patients seen since opening in January 2022
- 2905 cardiac CTs performed; 2151 were CCTAs
- Received the HeartFlow CT Quality award every quarter since opening (6 quarters consecutively); highest approval rate in our geography

# Case Studies



# Case 1

- 60 y/o M – well controlled HTN, HL, and exercises regularly
- His **mother died of an MI at age 61**
- Went on a family trip; walked 3-mile hike with incline
- After 1 mile walking uphill – he experienced dyspnea associated with chest tightness
- Rested for about 15 minutes with resolution of symptoms

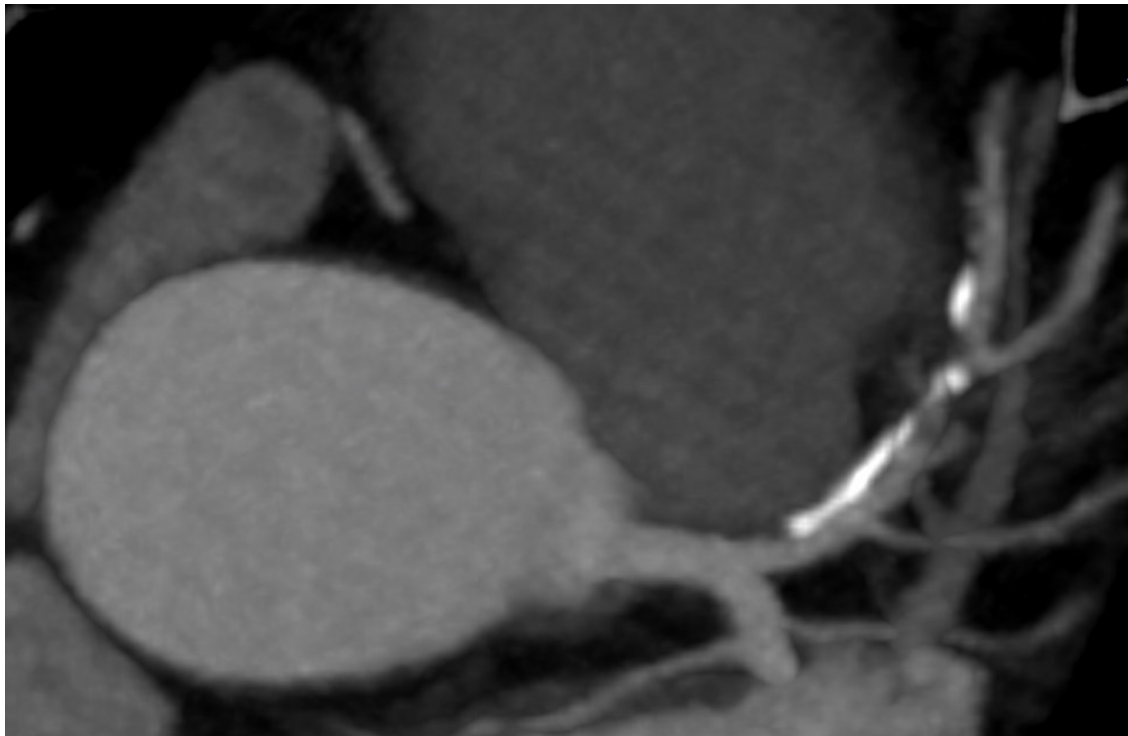


# Case 1

- Completed remainder of hike (downhill) without incident; symptoms did not return
- He contacted his PCP the next day; he was referred to CEC
- EKG on presentation showed sinus brady @ 53 bpm; labs (including troponin) normal
- CCTA performed 30 mins after arrival

# Case 1

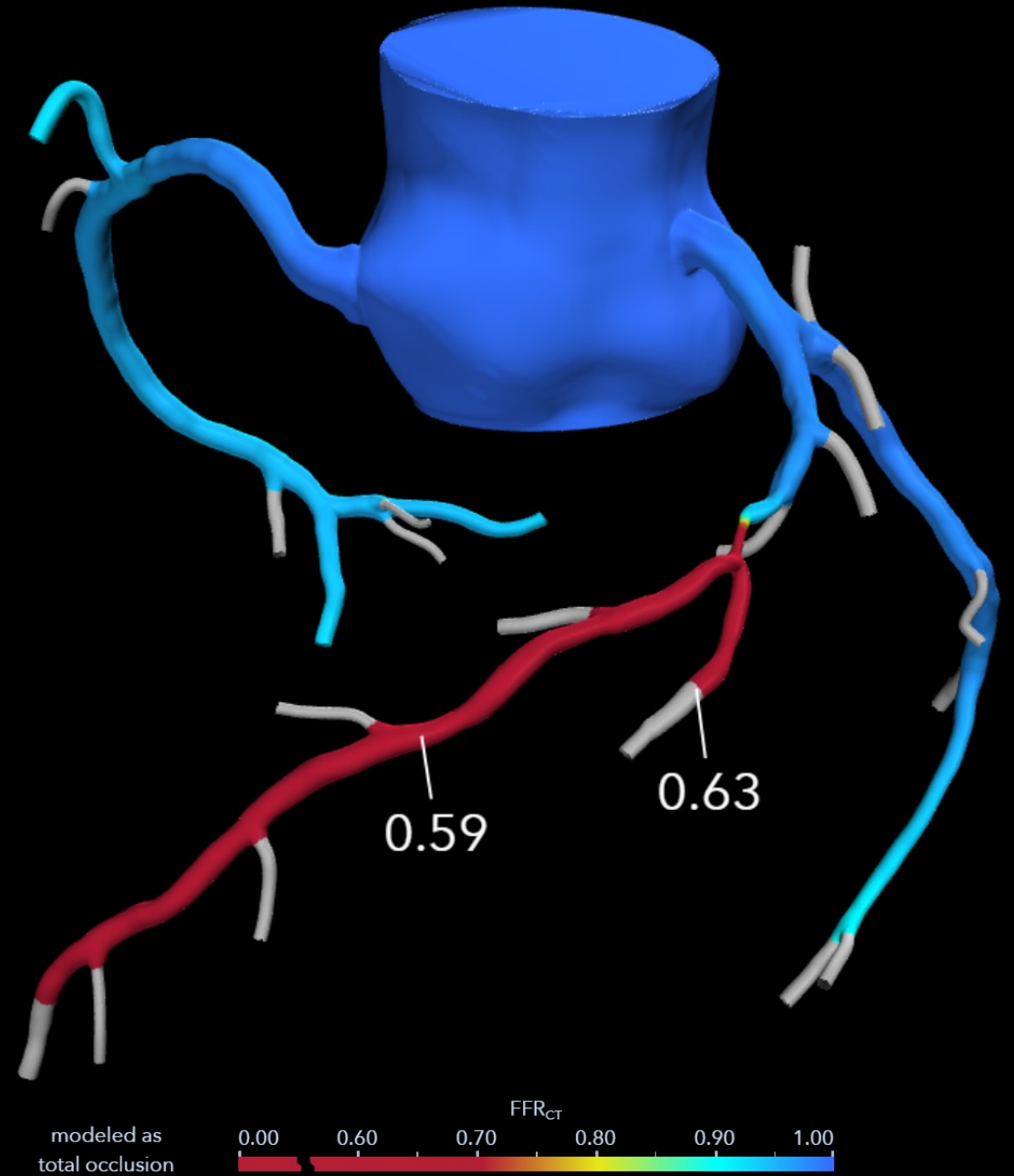
BMI 30 – HR 63 - 1 beat acquisition - .24 s rotation – 100 kV - 2.4 mSv



- CCTA showed obstructive (75-99% stenosis) eccentric mixed plaque involving the **proximal LAD**

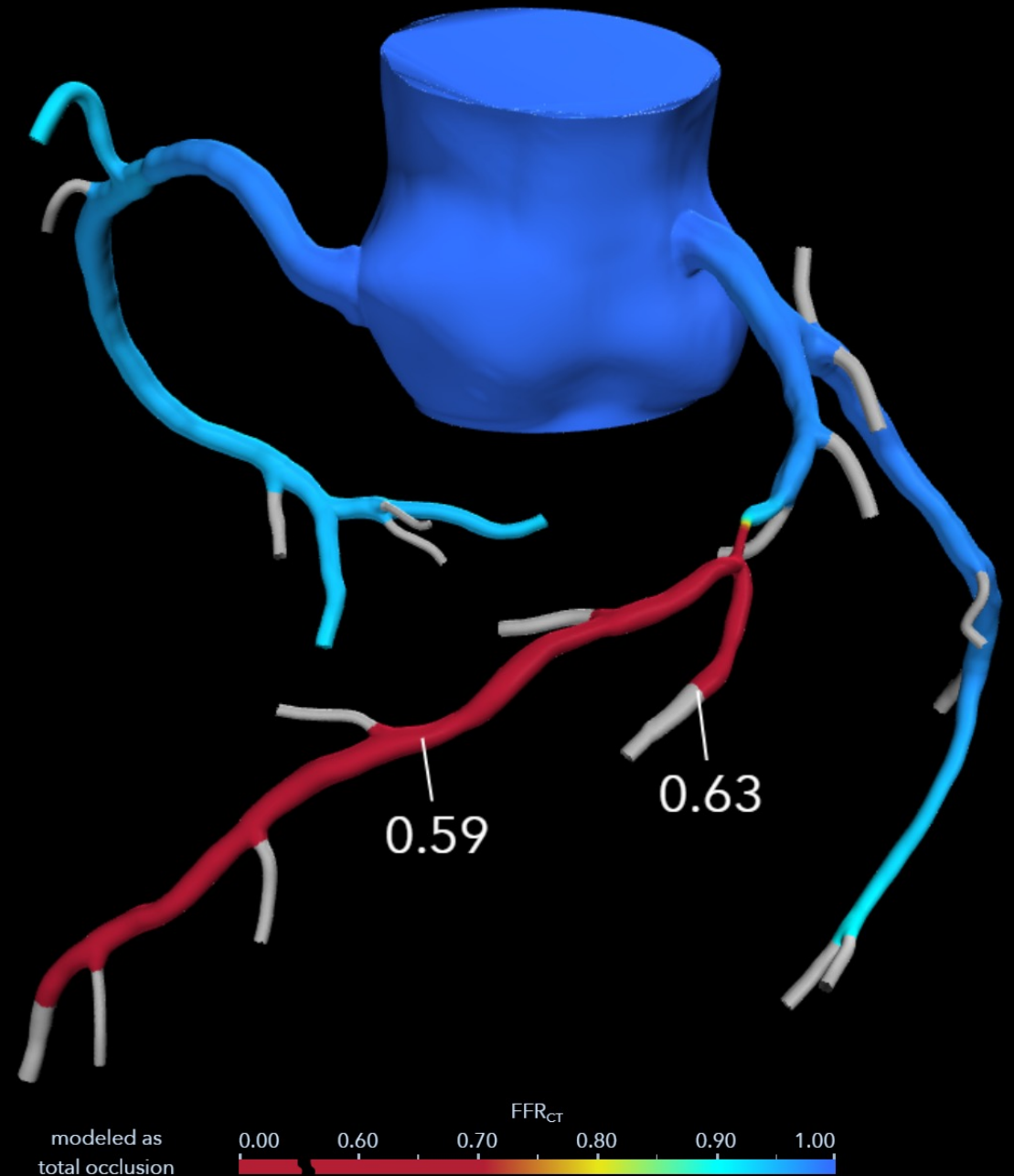
# Case 1

- FFR-CT was also performed
- Confirmed presence of a **hemodynamically significant lesion in the proximal LAD** also affecting flow in the D2 branch



# Case 1

- Patient was started on aspirin + nitrates (*no BB as HR was in 50s*) and discharged
- **Total visit time: 1 hour 45 mins**
- Underwent outpatient cardiac cath two days later which showed a 90% proximal LAD lesion
- Elective PCI was performed (DES to proximal LAD) and was discharged the same day





## Case 2

- 27 y/o M without any obvious CV risk factors (*LDL 94, no DM2, nonsmoker*)
- **One month prior to presentation**, he caught **COVID-19**. Unvaccinated, moderate symptoms (*fevers, cough*) for 3 days.
- After recovery, he noted **intermittent chest discomfort that radiated to his left arm**. He described it as a substernal tightness. He only felt symptoms **with exertion** (*walking up a flight of stairs*); no symptoms at rest.
- Symptoms relayed to PCP – ordered exercise stress echo

## Case 2

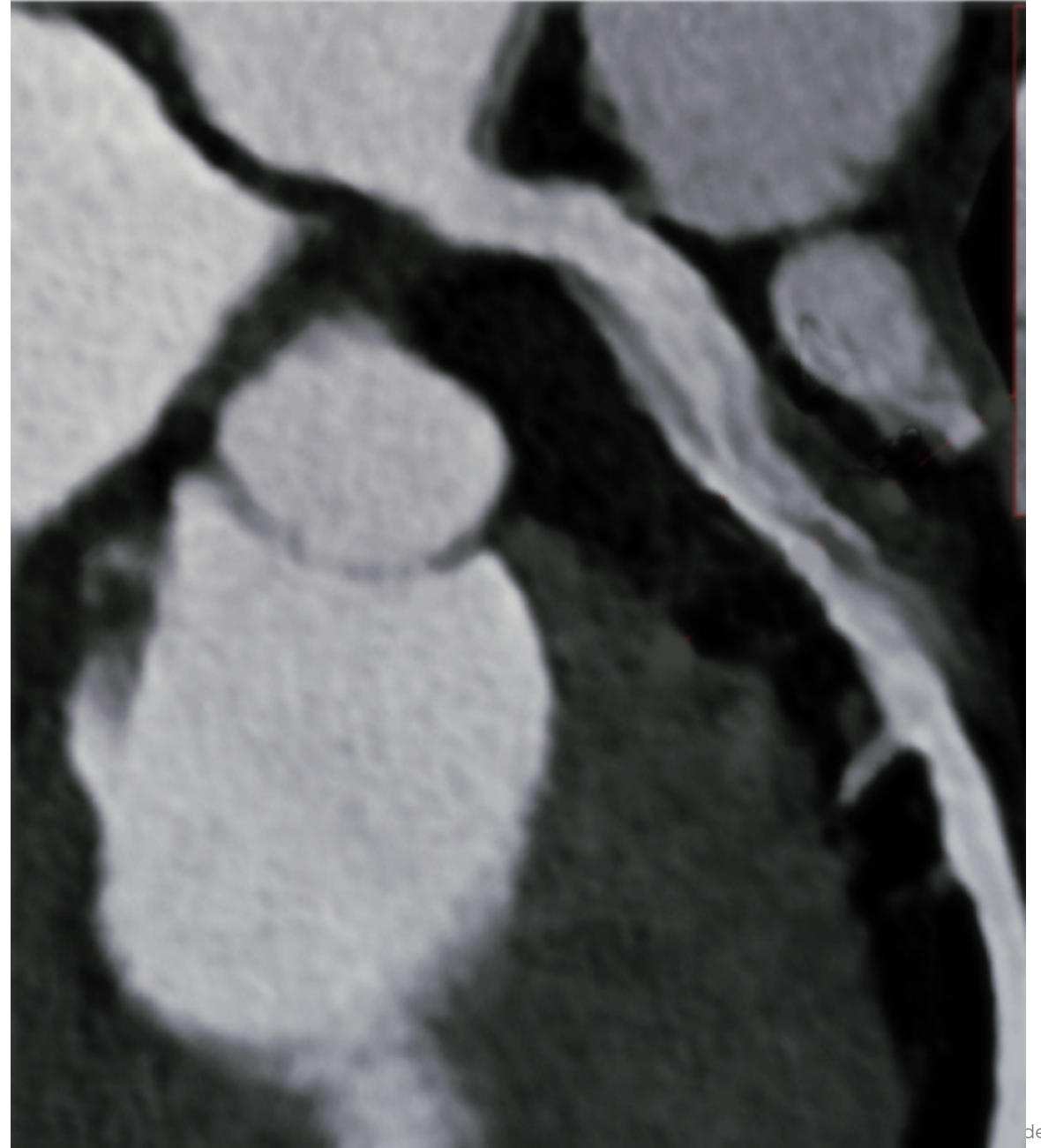
- Stress echo was performed and showed:
  - **EKG:** Normal resting EKG with **2.5 mm flat ST depression at 8 minutes into exercise;** resolved 5 minutes into recovery.
  - **Baseline echo:** Normal left ventricular systolic function and wall motion; EF 60%
  - **Stress echo: Exercise-induced hypokinesia** of the basal and mid anteroseptal, mid anterior, mid inferoseptal, apical inferior, apical anterior, and apical septal walls consistent with ischemia in the **proximal LAD distribution.**
  - **Symptoms: 6/10 chest pain** developed with stress that **completely resolved** in recovery.

## Case 2

- Given the findings, the patient's PCP was contacted by reading cardiologist
- As EKG changes and symptoms had resolved completely, the patient was sent to the CEC for same day evaluation
  - If EKG changes or chest pain had persisted, the patient would have been sent to ER via EMS
- Upon arrival at the CEC, the patient remained pain free
  - EKG appeared normal
  - Labs (*including troponin*) were normal
- CCTA was performed an hour after arrival

## Case 2

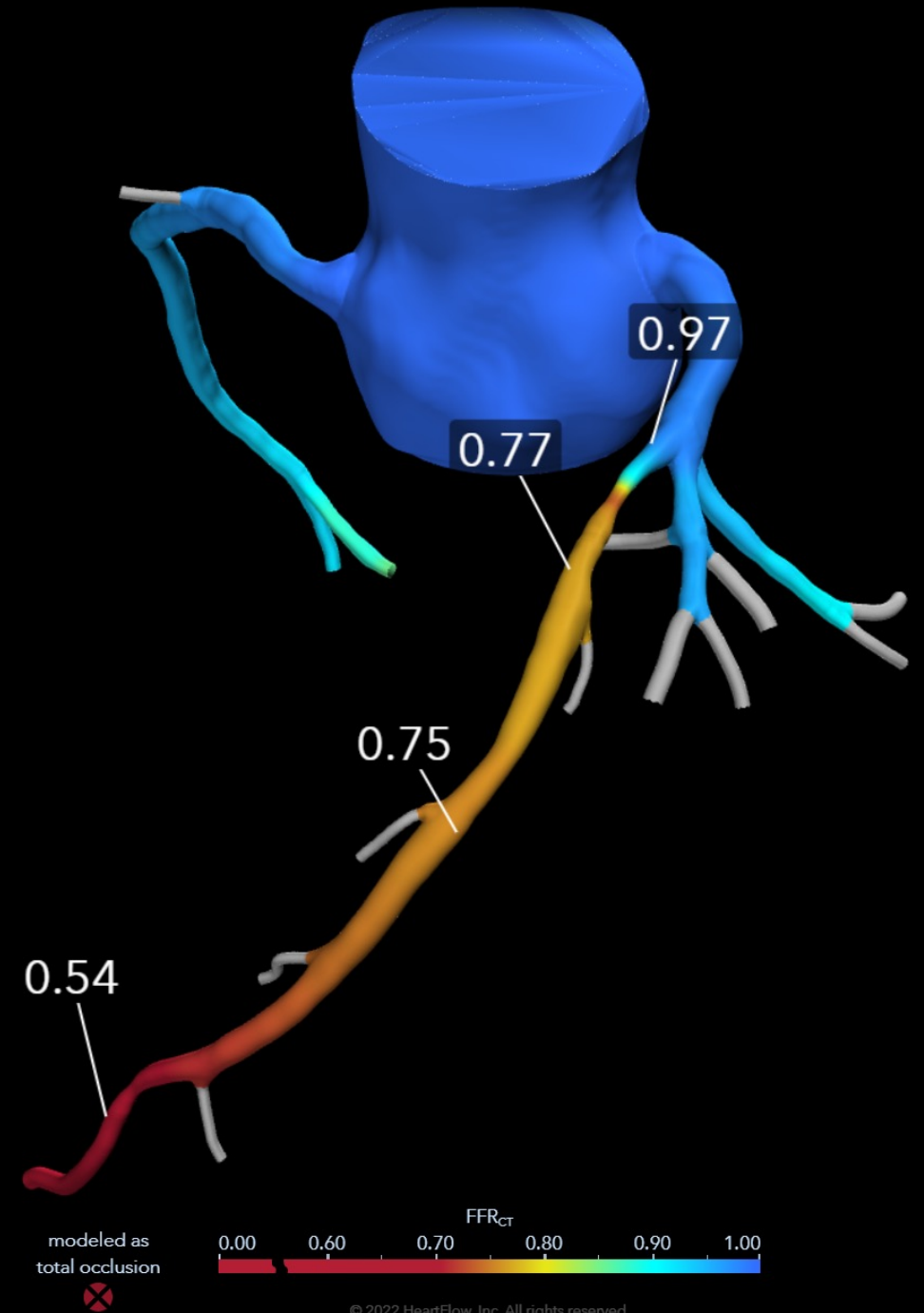
- CCTA revealed a **coronary dissection** involving the proximal LAD
- No evidence of atherosclerosis or calcification





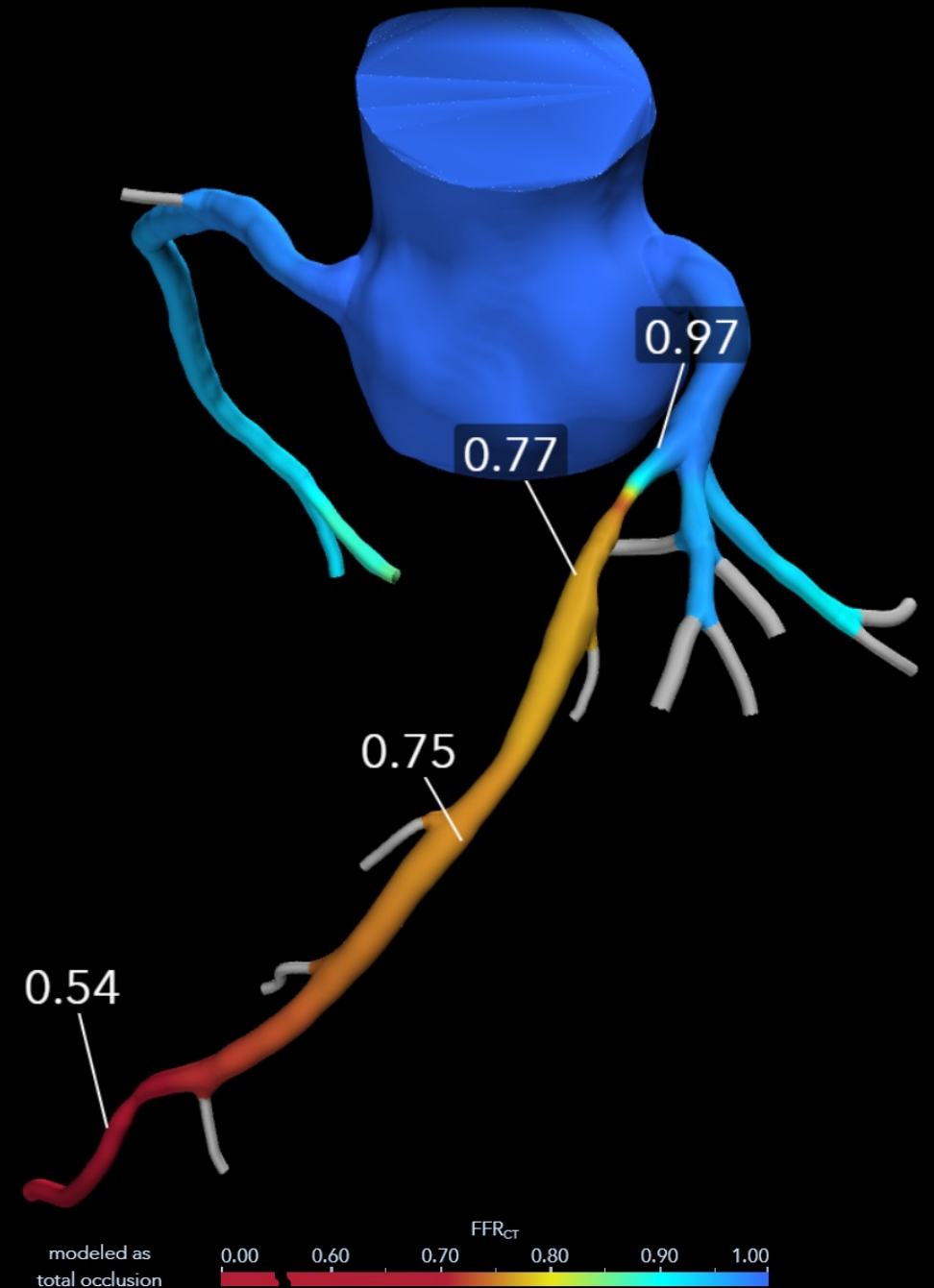
## Case 2

- FFR-CT confirmed a hemodynamically significant lesion in the proximal LAD
- The patient was **directly admitted** to the hospital for further evaluation (*bypassing ER*)
- **Total time at CEC: 2 hours**



## Case 2

- The patient was started on antiplatelet therapy + beta-blockade and observed for 48 hours
- Seen by CT surgery who agreed with conservative management
- Discharged home with instructions to avoid heavy exertion for 30 days
- Repeat CCTA a month afterwards showed **healing of dissection**; referred for phase II cardiac rehabilitation



## Case 3

- 59 y/o M with history of elevated coronary calcium score (*800 in 2020*) has noted **intermittent substernal chest pain for the past two months.**
  - Primary trigger for pain is emotional stress.
- He has severe OA of R knee and has been less active; unable to exercise on treadmill
- Reesting EKG showed new RBBB
- Lexiscan nuclear stress test ordered by PCP: no ischemia; EF 57%

## Case 3

- Symptoms steadily increased in frequency over the next month -> sent to CEC
- Upon arrival at the CEC, labs (*including troponin*) were checked and were normal
- Given new RBBB and recent normal stress test, d-dimer was checked and was normal
- **CCTA was performed 45 minutes after arrival**



## Case 3

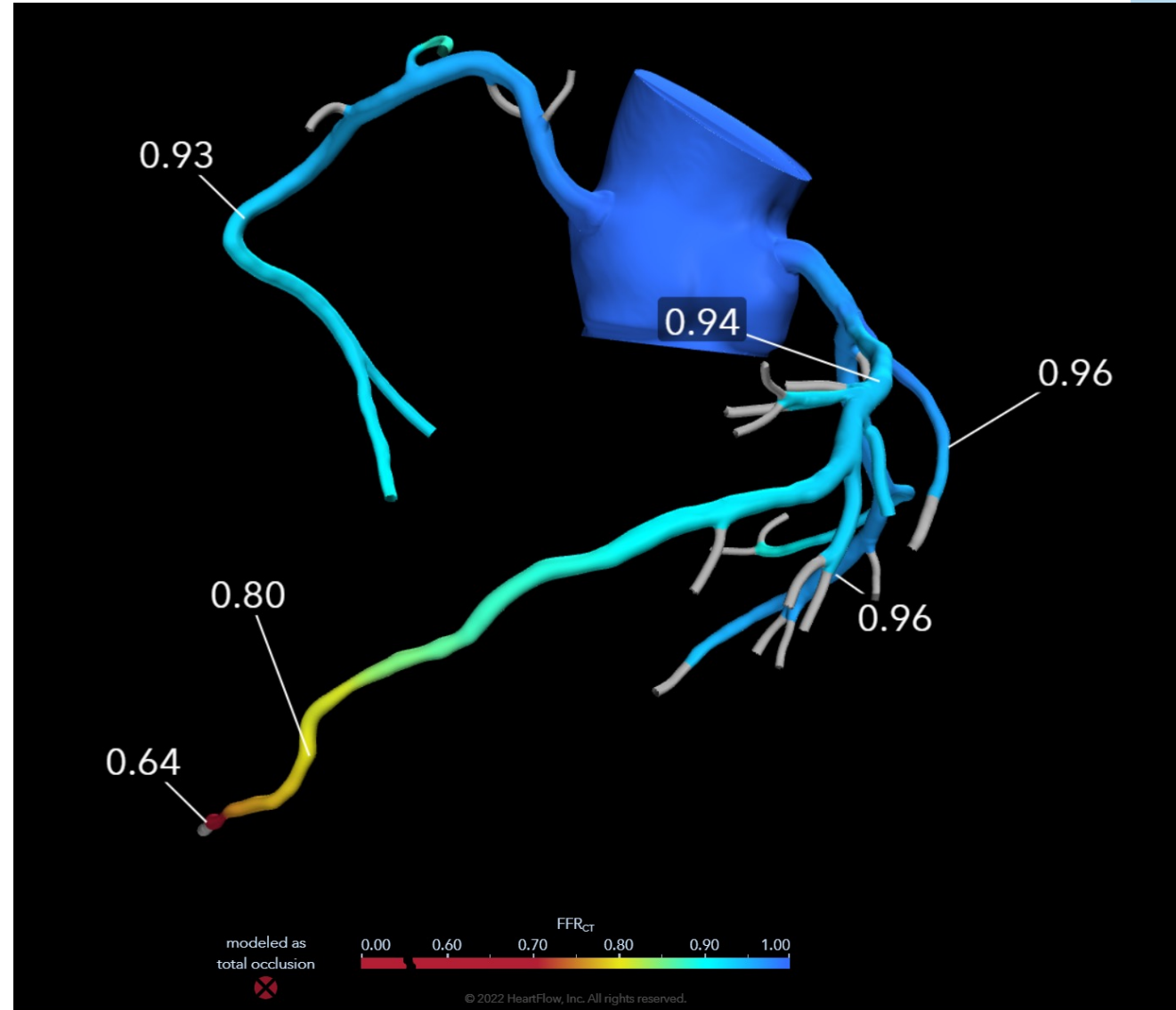
- CCTA showed moderate diffuse disease in the proximal and mid LAD with a **severe stenosis in the very distal/apical LAD**
- Nonobstructive disease was noted in the LCx and RCA



BMI 32  
HR 63  
1 beat acquisition  
0.24 s rotation  
100 kV  
2.1 mSv

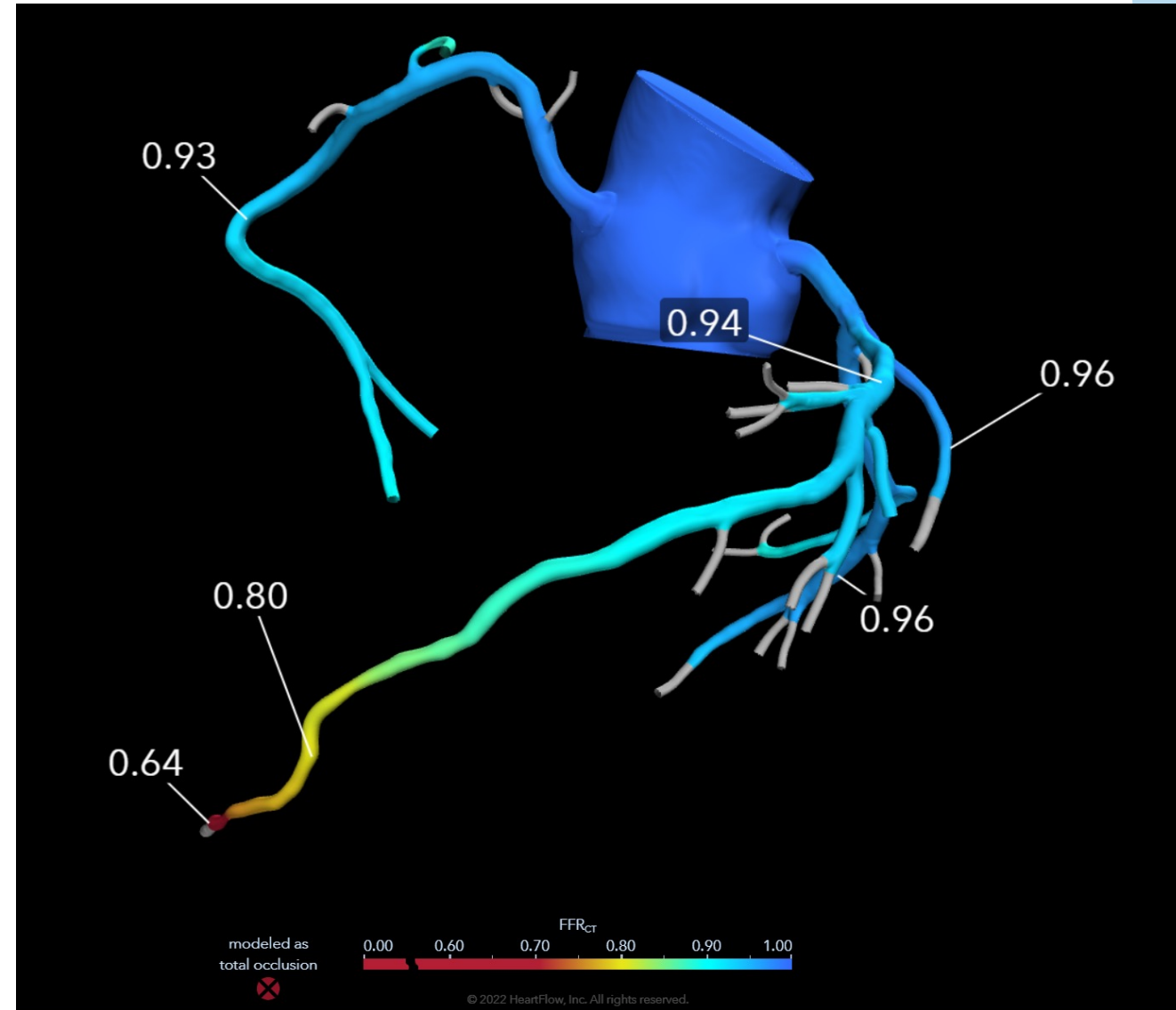
# Case 3

- FFR-CT confirmed hemodynamically significant disease in the very distal / apical LAD (FFR = 0.64)



## Case 3

- Above findings were discussed with patient; aggressive medical therapy recommended given distal ischemia
- The patient was started on beta-blockers and nitrates; discharged with outpatient follow-up->symptoms improved a week later
- **Total visit time: 90 mins**



## Case 4

- 67 y/o M with **morbid obesity (BMI 54)**, DM2, HTN, HL
- He reports a mild intermittent chest pressure has been going on for the past year; occurs at random (with or without activity)
- He also notes chronic DOE that he attributes to obesity and inactivity
- In 2017, he had a Lexiscan SPECT stress test done which reported anterior wall ischemia; cardiac catheterization showed mild diffuse nonobstructive CAD



## Case 4

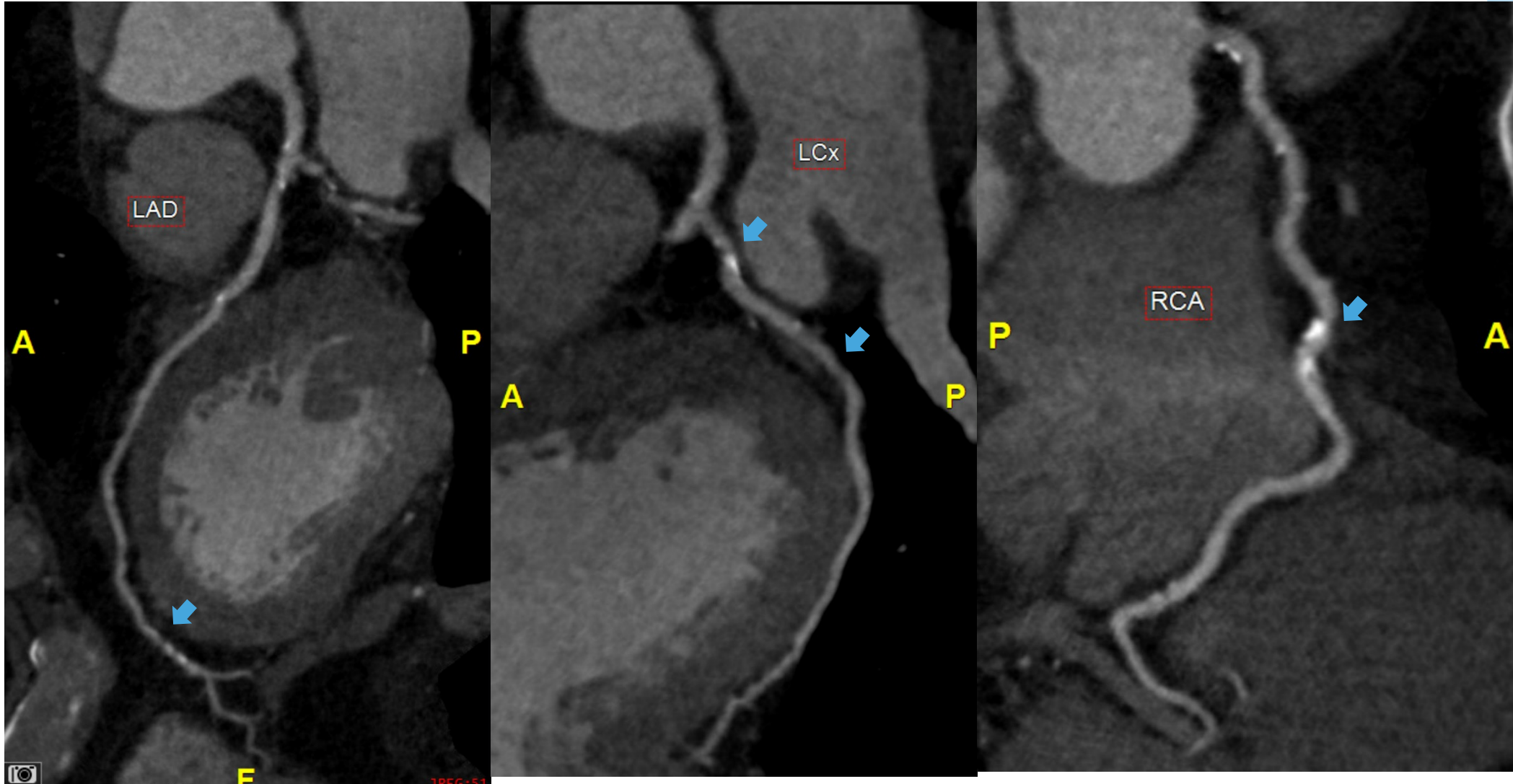
- He was referred to our CEC for evaluation
- Upon arrival, he was noted to have a BP 130/80 and **HR 88**
- Labs showed negative troponin; EKG showed low voltages with nonspecific T-wave abnormalities
- For scanning large patients (BMI>35), we reduce rotation speed from 0.24 to **0.27 ms** and use **120 kV (generally don't use 140 kV)**
- To compensate for loss of temporal resolution, we try to target HR <65 (**ideally ≤60 bpm**)

## Case 4

- He was discharged (50 minutes in CEC) and planned to **return the next day with pre-medication for rate control**
- Prescribed metoprolol tartrate 100mg the night before and the morning of his scan
- His HR on arrival now was 74 bpm
- He was given an additional 100mg of metoprolol tartrate and 15mg oral ivabradine
- Two hours later; HR was 60 bpm
- CCTA was performed.

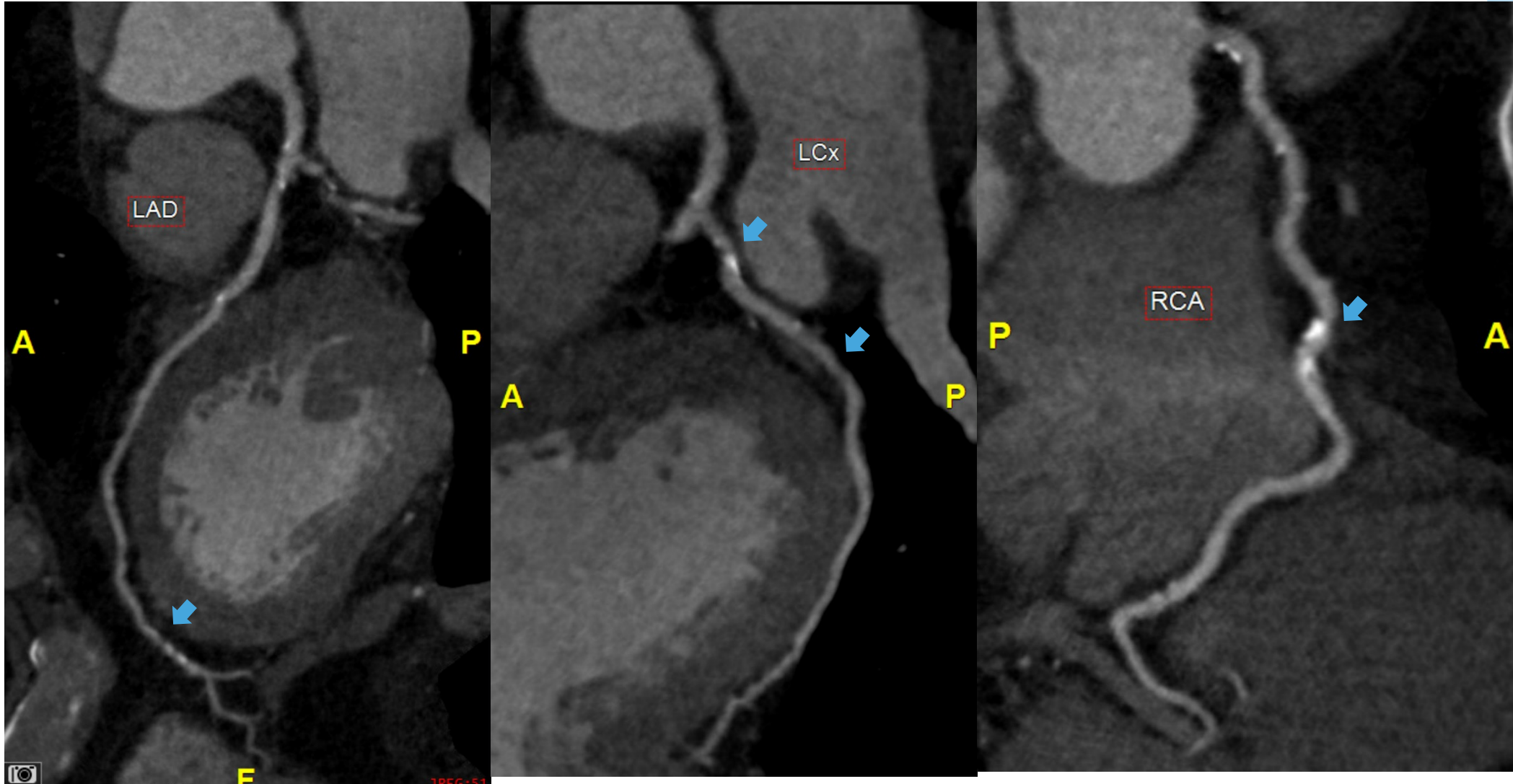
## Case 4

- LM:
  - Mild distal disease
- LAD:
  - Possibly significant disease (50-69%) in distal LAD and D2
  - Mild disease in prox and mid LAD



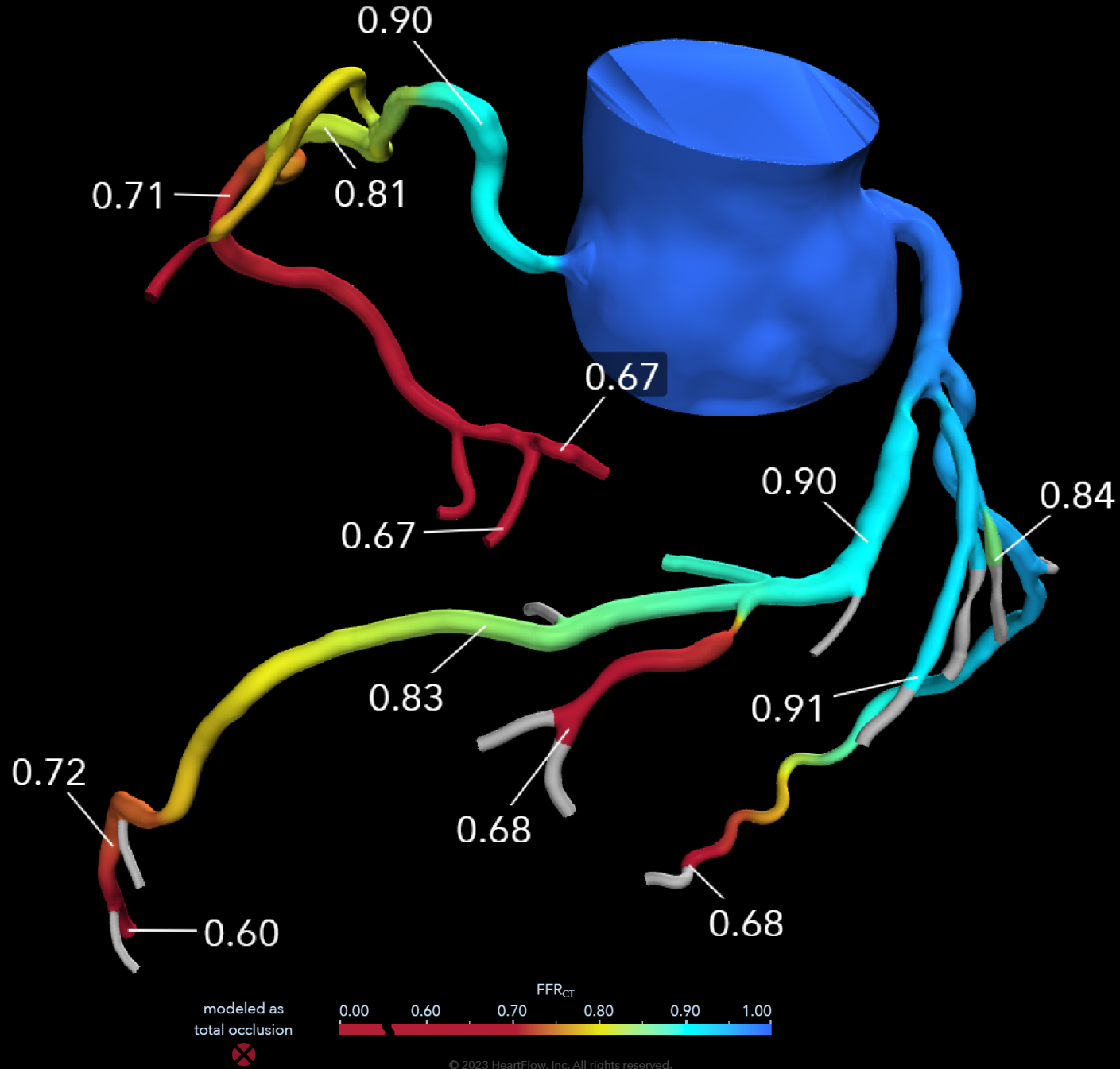
## Case 4

- LCx:
  - Possibly significant disease (50-69%) in prox LCx and prox OM1
- RCA:
  - Possibly significant in mid RCA
  - Mild disease in prox and distal RCA



# Case 4

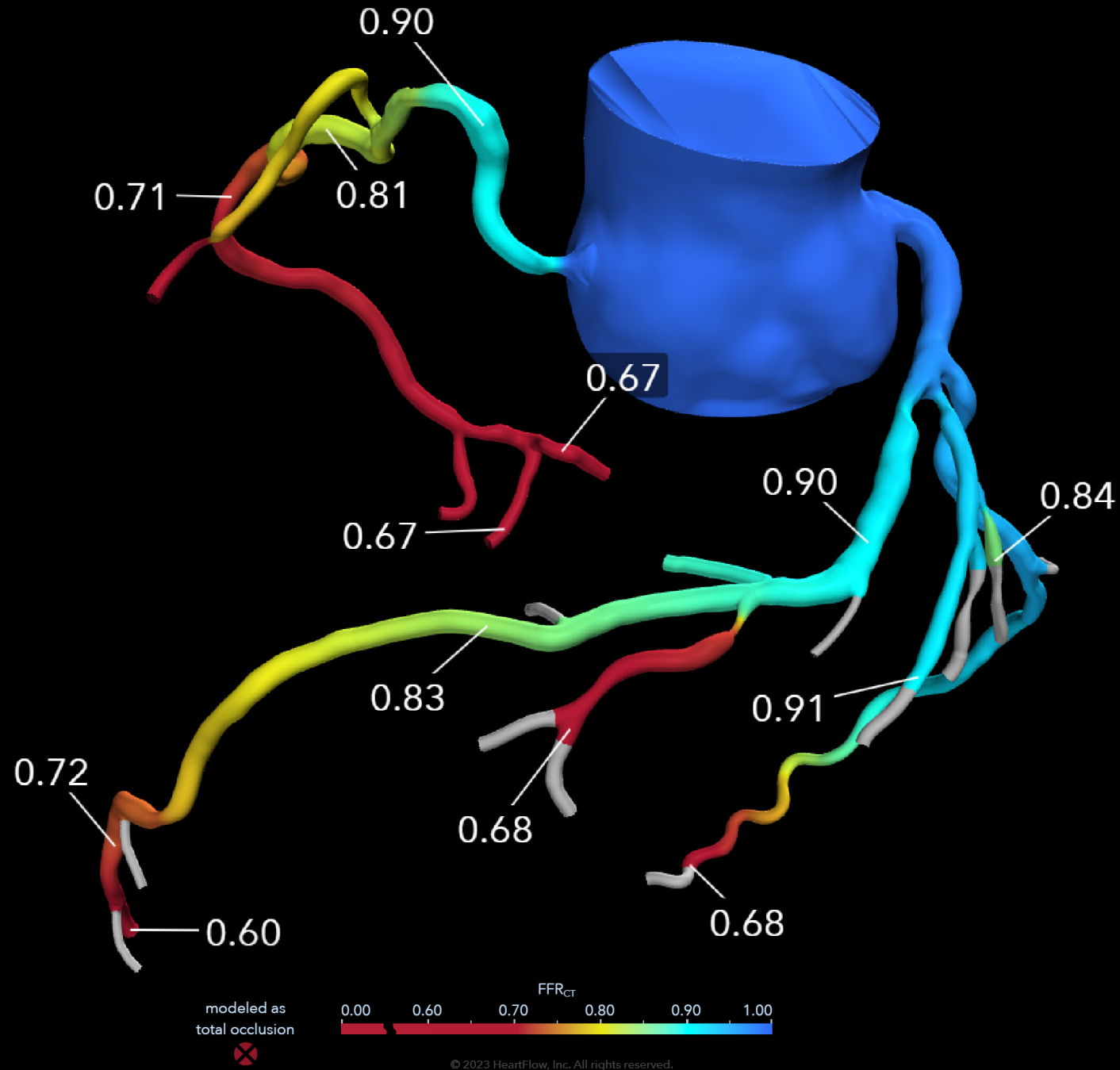
- FFR-CT showed hemodynamically significant lesions in the:
  - Mid RCA
  - Ostial D2
  - Distal LAD and distal OM2





## Case 4

- He subsequently underwent cath
- 80% mid RCA; 90% ostial D2; 80% distal LAD and distal OM2
- PCI (DES) to the mid RCA; POBA of the ostial D2
- Medical therapy of the distal LAD and distal OM2 lesions



## Case 5

- 74 y/o F with presenting with CP
- She has RA, HTN and HL; **calcium score of 900 back in 2005**->has been on aggressive GDMT since that time
- She has longstanding GERD which manifests as heartburn after eating
- Over the past couple months has noted heartburn without eating and sometimes with exertion

## Case 5

- She was referred to the CEC for further evaluation (Friday afternoon); daughter is a physician
- EKG was normal; troponin was also normal
- HR was 58 on arrival
- CCTA was performed

## Case 5

- CCTA showed heavy calcification of the distal LM extending into the ostial LAD and LCx; also in proximal LAD
- Could not accurately quantify stenosis in LM and proximal LAD
- Nonobstructive disease (25-49%) in mid LAD, mid LCx and proximal and mid RCA

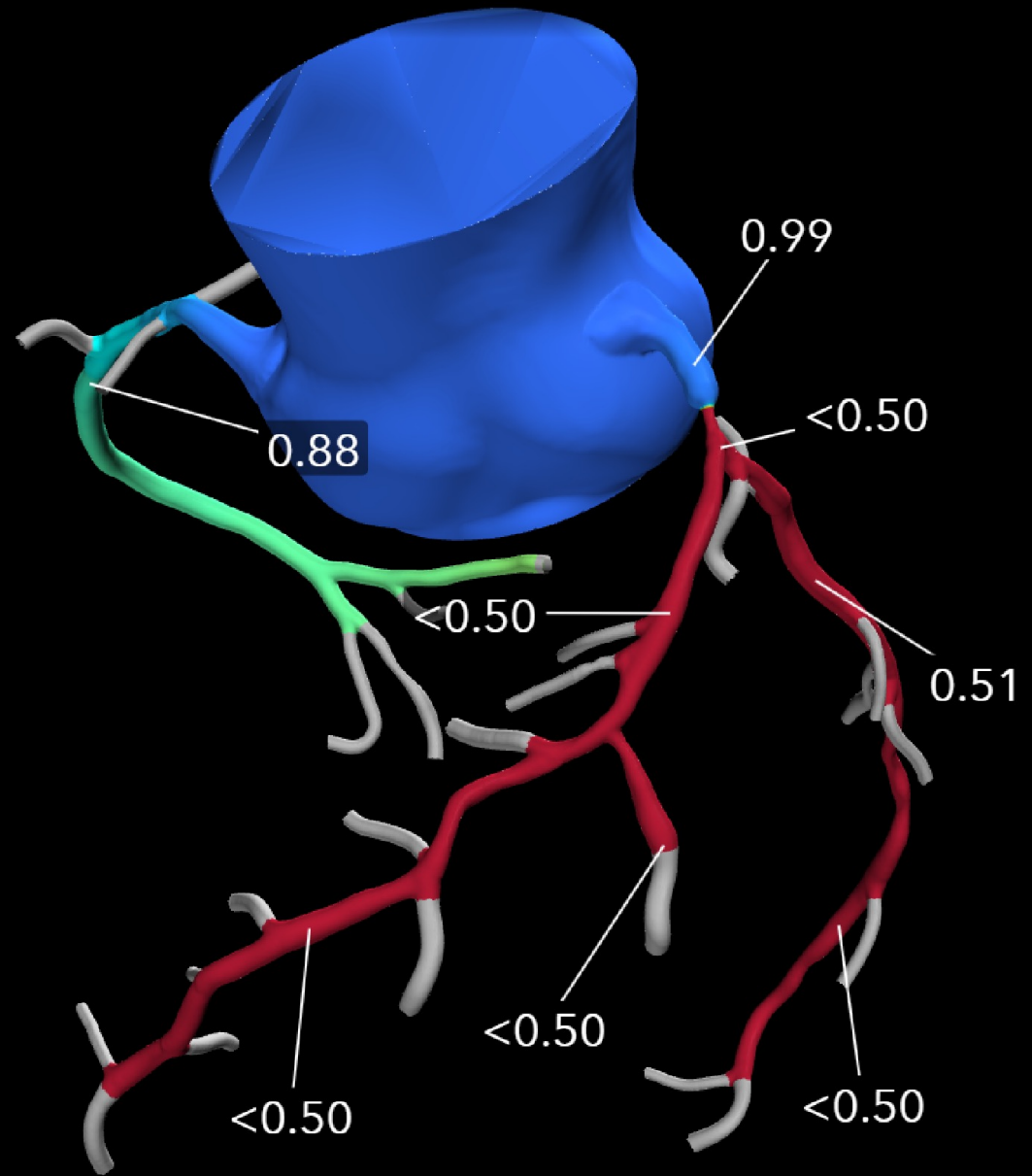


BMI 24  
HR 58  
1 beat acquisition  
0.24 s rotation  
100 kV  
1.8 mSv



## Case 5

- FFR-CT however demonstrated severe stenosis in the distal LM
- RCA confirmed to have no hemodynamically significant disease








# Conclusion

- Our CEC allows us to offer expedited outpatient evaluation of heart disease
- Chest pain has been a major focus of the CEC; CCTA is our preferred first-line test in patients without prior obstructive CAD (*in line with 2021 ACC/AHA guidelines*)
- Our Arineta/GE CardioGraphe™ scanner is the cornerstone of our Cardiac Evaluation Center
- We have plans to open two more CECs with CardioGraphe™ scanners at each location



# Cardiac CT in an office/outpatient setting – How to make it successful

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Q&A			

# Cardiac CT in an Office/Outpatient setting- How to Make it Successful

CARING FROM THE HEART.

## Cardiac CT in an Office/Outpatient Setting - How to Make it Successful

Presented by  
**Jennifer Espey, AS, ARRT (CT)**  
CT Manager

**Kyle M. Brownell, BS, CNMT, NMTCB (CT)**  
Assistant Director of Operations  
Capital Cardiology Associates



CARING FROM THE HEART | A BENCHMARK CARDIOLOGY PRACTICE<sup>SM</sup>

[www.CapitalCardiology.com](http://www.CapitalCardiology.com)





***“No barriers to the community seeking cardiac care.”***

Dr. DeLago —

**CCA developed onsite diagnostic imaging that started with Echo, Nuclear Stress testing and grew to include Cardiac CT and Cardiac PET/CT, TEE.**

**Patients being seen in hospital, but could not get testing for days.**

# ECA Workflow

CARING FROM THE HEART.



Sent by Primary Care Provider due to abnormal EKG ( LBBB), or Blood pressure concern, or any cardiac symptom (palps, SOB, CP)

Sent by Gastroenterologist

Sent for pre-op clearance by Orthopedic Surgeons

Sent by ER

2 negative Troponin blood tests-> discharged-> arrive at ECA next business day

**Walk-in**

Co-payment of office visit

*Continued on next slide...*

# ECA Workflow continued...

CARING FROM THE HEART.

Triaged by RN and  
Standing Order  
Bloodwork

CMP  
CBC  
Troponin  
BtNP

Advanced  
Practitioner

**AP evaluates  
patient,  
reviews labs->  
develops plan  
of care**

Physician

Reviews and  
approves plan of  
care and patient  
progresses

On Site Same  
Day Testing

Bloodwork  
Echo  
Exercise Stress  
Test  
Nuclear MPI  
Stress Only  
Cardiac CT

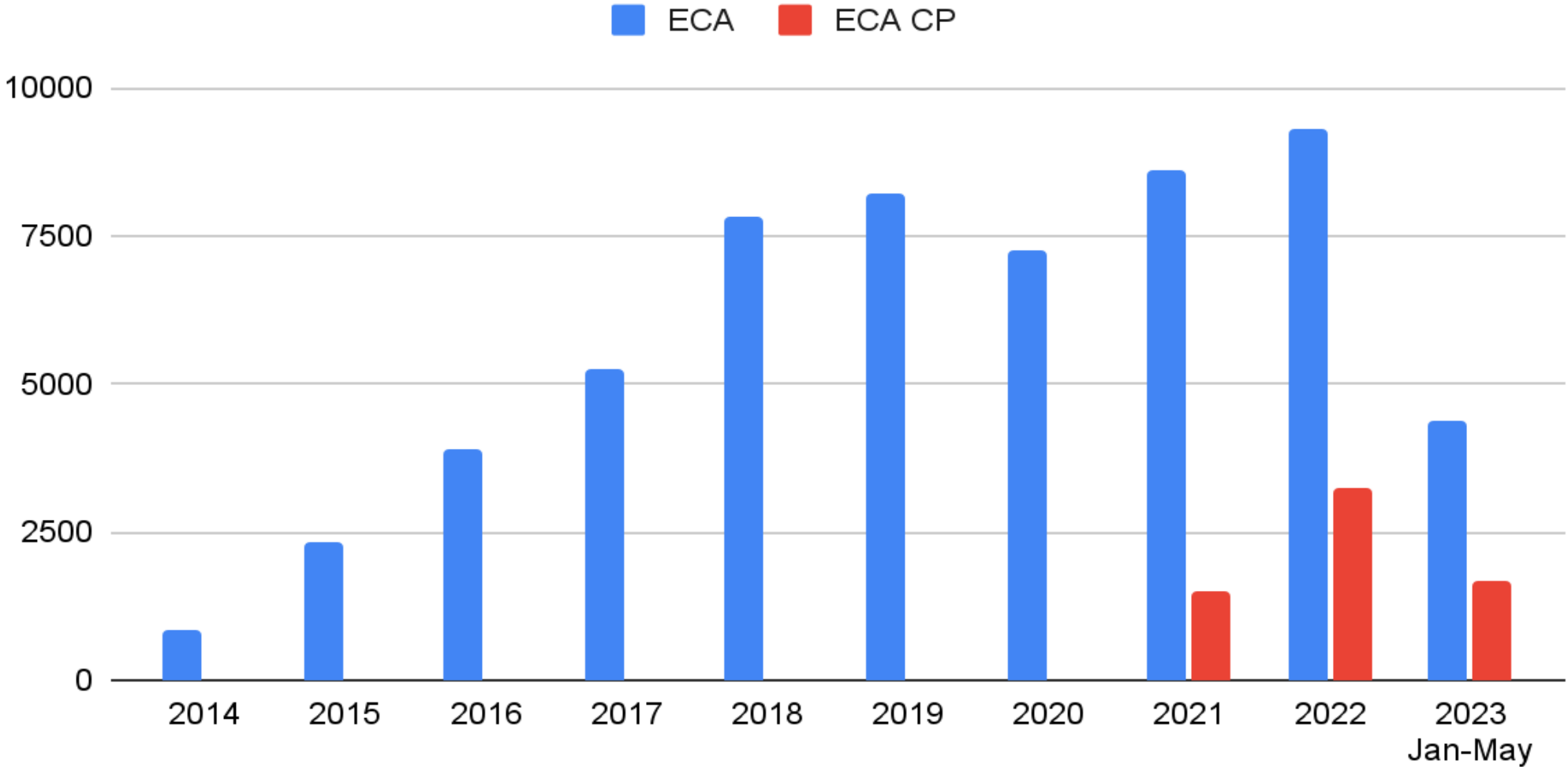
Direct  
Admit/Discharge

Test results  
finalized and  
patient is  
discharge or direct  
admit to hospital/  
cardiac caht lab (  
bypass ER)

# Volumes

E HEART.

## ECA, ECA CP and ECA Total

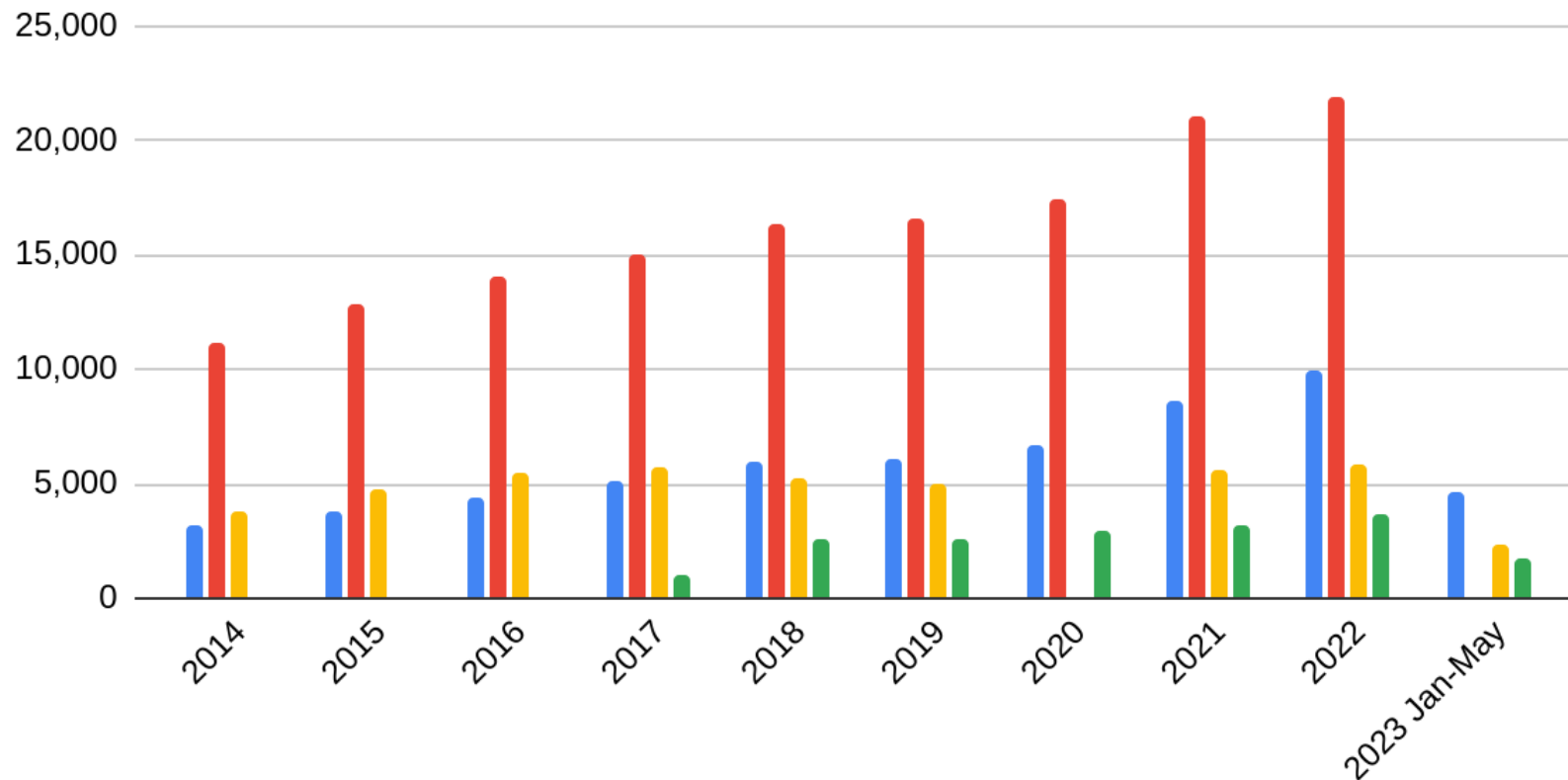


# Volumes

CARING FROM THE HEART.

## CT, Echo, Nuc and PET

CT Echo Nuc PET



- Nuclear volumes - neutral
- PET Volumes - positive growth
- CT VOLUMES
- 2022- 8076 / Avg 31 pts per day
- 2023- 3841 / Avg 25 pts per day
- Record High 45 patients / 22 SH patients

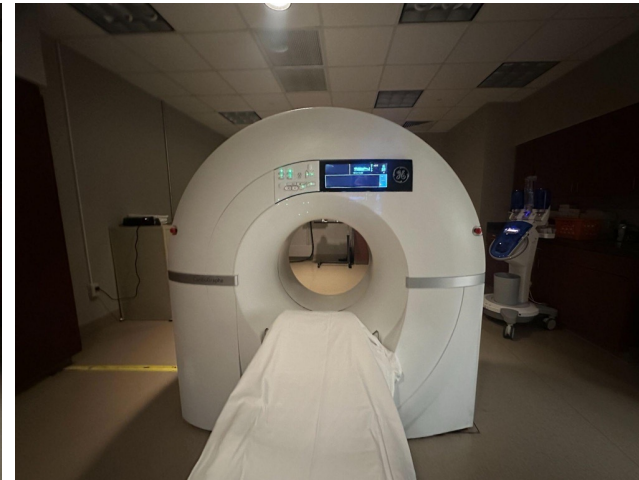


# Layouts



THE HEART.

**Clifton Park 13'8" x 20'**



**Southwoods 15' x 24'**

# Staffing Model

CARING FROM THE HEART.

**2 CT Technologists ->22 exams**

**3 CT Technologists ->up to 40 exams  
(non-Structural heart clinic)**

**Structural Heart Clinic -> 3 CT  
Technologists**

- **half day 12 patients**
- **full days 22 patients**

**CT- 2 units, 7 Full Time CT Technologists**

## Achieving Volumes with Quality First - a Technologist's perspective

1. Knowledgeable Cardiac CT Technologist
2. Standing protocols
3. Communication - between all staff members  
Nurse/Technologist/Ancillary Staff
4. No problem attitude - The saying at CCA is not NO ... ***“It is No Problem”***. Technologists, Nurses, Ancillary staff need to be willing and able to think outside the box. ***“How can we get this done?”*** ***“What do we need to get it done?”***

**From the perspective of the CT Technologists :  
CardioGraphe has made a huge impact in all  
cardiovascular scans. Here are examples of how it  
has improved workflow:**

- 1. Decreased the number of patients that were cancelled due to claustrophobia, high heart rate, increased heart rate after full protocols of medications given.**
- 2. Radiation dose has improved for all scans**
- 3. There is no step artifact in the LAD, or Aortic Valve for TAVR. (less repeats)**
- 4. Ease of use for the CT technologist. Technologists can scan same day as applications comes in and trains.**
- 5. Increased the amount of patients that can be scanned without any medication ( used to medicate calcium scores )**
- 6. Dr's like the scans therefore no phone calls or tasks and we get complimented on how great we are doing !!!!!**

- 1. High Heart Rate**
- 2. High BMI**
- 3. High Calcium**
- 4. Stent Imaging**
- 5. TAVR**



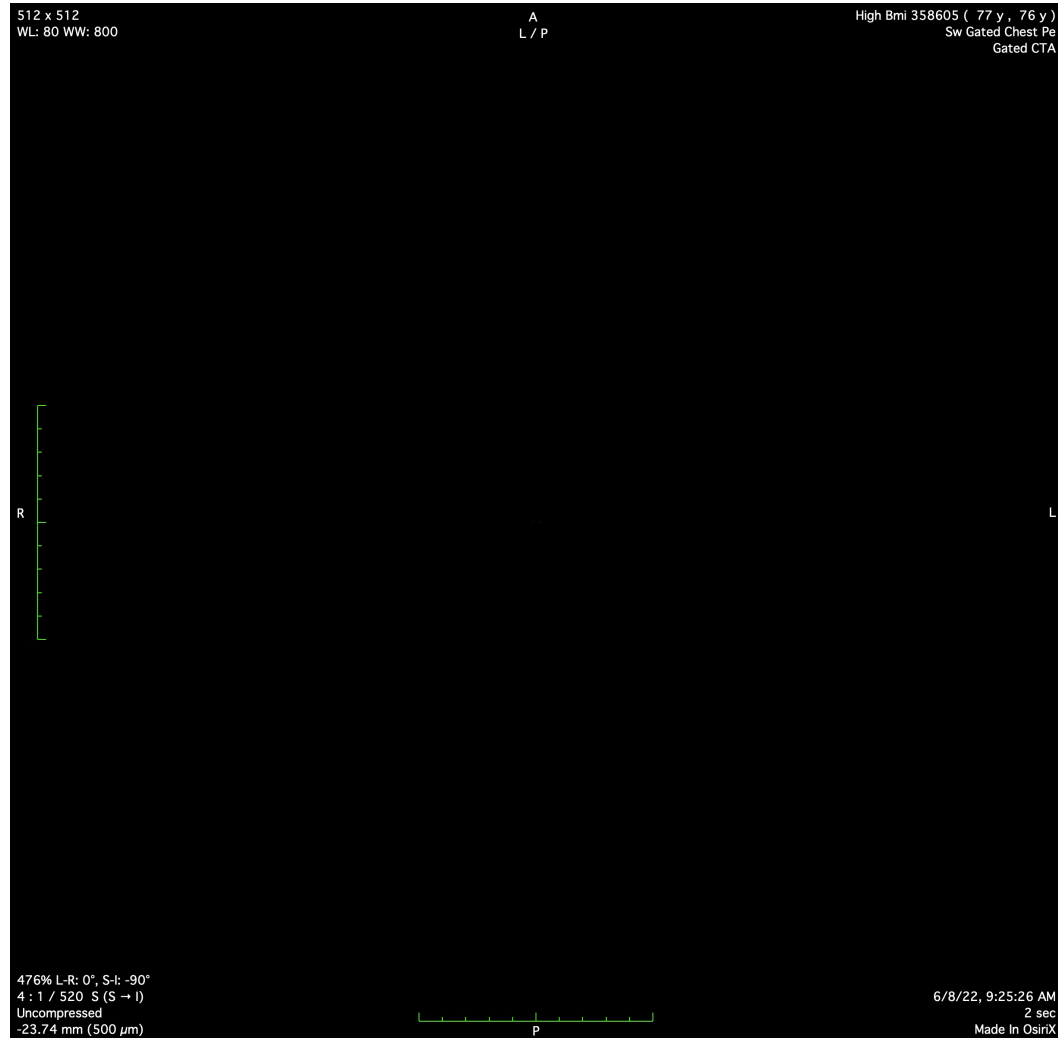
# High Heart 89-99 BPM - BMI 27.5 - phases 40-80%

CARING FROM THE HEART.



# High BMI of 60.9 for PE using 450mm coverage

CARING FROM THE HEART.



# High Calcium Coronary - 935 calcium score

CARING FROM THE HEART.

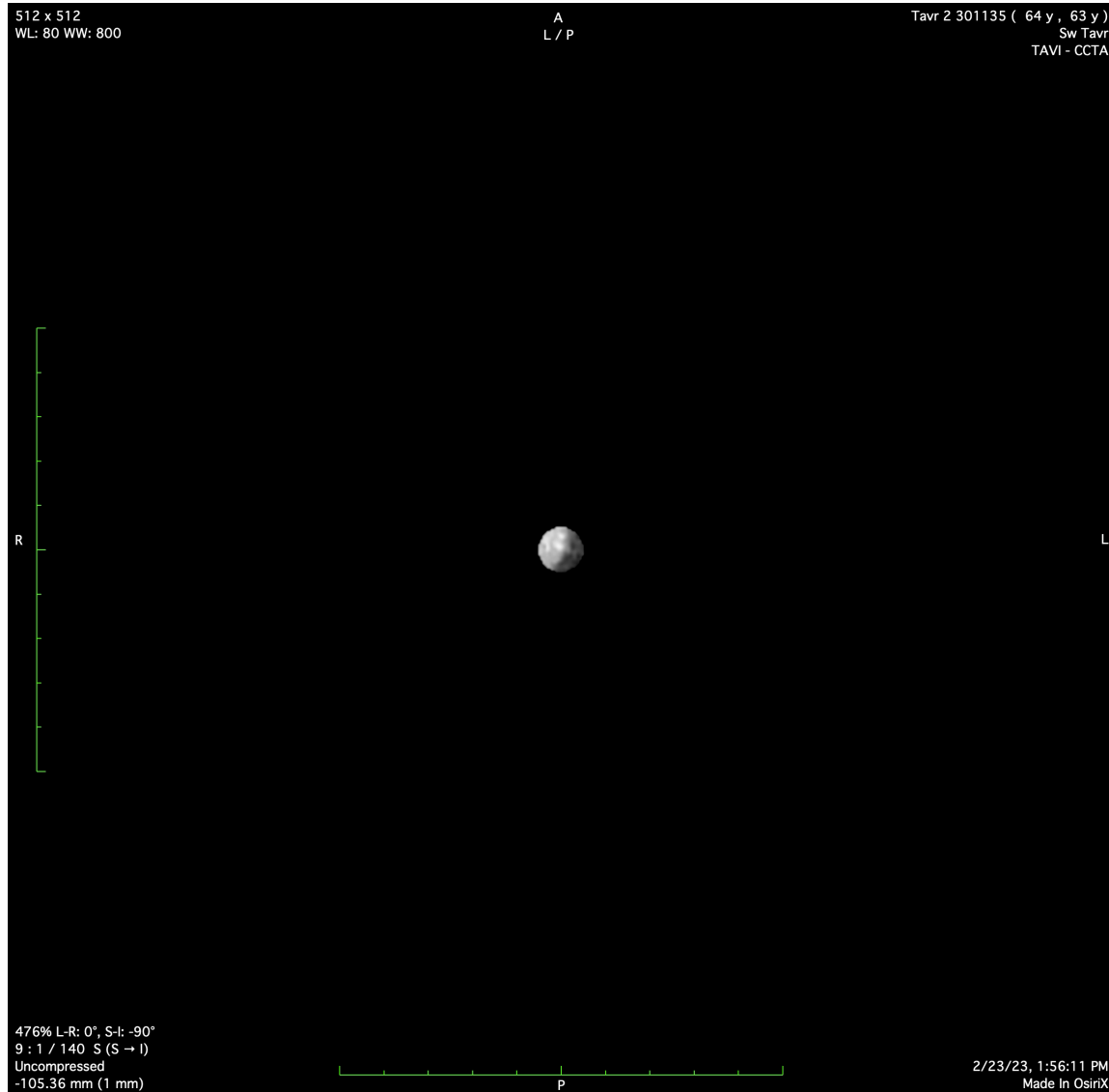


# 8 Stents - High Resolution

CARING FROM THE HEART.



# Pre-TAVR Planning : BMI 45.6





# Field of View

CARING FROM THE HEART.

## 250 FOV

### *Advantages:*

coned down, higher resolution of the heart.

### *Disadvantages:*

May not get entire lung field, larger hearts can be more difficult to obtain isocentric positioning.



## 450 FOV

***Advantages:*** Ability to obtain full lung field, allows for subsegmentals for PE studies, pleural effusions, Covid

***Disadvantages:*** Outside of the 250 FOV there is a noticeable but small change in resolution



## Optimizing Cardiac CT Program:

- **CardioGraphe fits in smaller space than traditional CT**
- **Steady increase in Cardiac CT usage without cannibalizing Nuc/PET**
- **Lower radiation exposure**
- **FOV: 450 see lungs, FOV 250 higher resolution of heart**
- **Start with 2 skilled CT technologists**
- **Superior imaging equipment for quality Cardiac CT program.**



**THANK YOU**

# Cardiac CT in an office/outpatient setting – How to make it successful

## Agenda

Topic	Speaker	Title
Introduction	Scott Schubert	CEO, Arineta
Clinical applications of office-based cardiac CT	Sujith Kalathiveetil MD, FACC	Director of Advanced Imaging, Section of Cardiology, Duly Health and Care
Cardiac CT in an office/outpatient setting – How to make it successful	Kyle M. Brownell, BS, CNMT, NMTCB(CT)	Assistant Director of Operations, Capital Cardiology Associates
	Jennifer Espey, L.R.T (CT)	CT Manager, Capital Cardiology Associates
Cardiac CT Economics – Breaking down the myths	Ginger Biesbrock DSc, PA-C, FACC	Executive Vice President, Care Transformation Services, MedAxiom
Q&A		







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# ADDRESSING THE ECONOMIC MYTHS FOR CTA ADOPTION

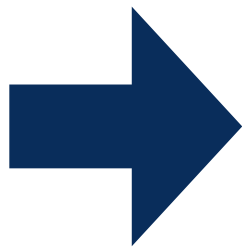
Ginger Biesbrock, DSc, PA-C, FACC  
EVP of Care Transformation





# CTA ECONOMIC DOSSIER AND CALCULATOR

## Method for Model Development



- Released July 2023
- Review of CTA research publications and gray literature focused on CTA use cases and program impact
- MedAxxcess data to compare practice trends between high CTA users and intermediate to low CTA users
- 2023 expenses and CMS reimbursement applied to models to develop program economic impact

# MYTH #1 – CTA HAS LIMITED USE

CLINICAL PRACTICE GUIDELINE: FULL TEXT

## 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

FEATURE | CT ANGIOGRAPHY (CTA) | SEPTEMBER 09, 2020

### Current Evidence for Cardiac CT Calls for Change in Recommendations and Reimbursements

*for the evaluation of patients*

2021  
AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Martha Gulati, Phillip D. Levy, Debabrata Mukherjee, Ezra Amsterdam, Deepak L. Bhatt, Kim K. Birtcher, Ron Blankstein, Jack Boyd, Renee P. Bullock-Palmer, Theresa Conejo, ... See all authors

Originally published 28 Oct 2021 | <https://doi.org/10.1161/CIR.0000000000001029> | Circulation. 2021;144:e368–e454

## Guideline Provides Class 1

nda



CURRENT CARDIOVASCULAR IMAGING REPORTS

springer.com

[Curr Cardiovasc Imaging Rep.](#) 2017; 10(5): 15.

Published online 2017 Mar 27. doi: [10.1007/s12410-017-9412-6](https://doi.org/10.1007/s12410-017-9412-6)

PMCID: PMC5368205

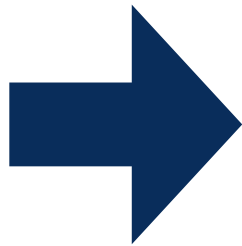
PMID: [28446943](https://pubmed.ncbi.nlm.nih.gov/28446943/)

### The Updated NICE Guidelines: Cardiac CT as the First-Line Test for Coronary Artery Disease

# CTA – MULTIPLE USE CASES

Cardiac CT use is increasing incrementally in the U.S. with guideline support of CAD detection, diagnosis and pre-planning management.

In addition, CT use is expanding for vascular, structural heart and electrophysiology indications.



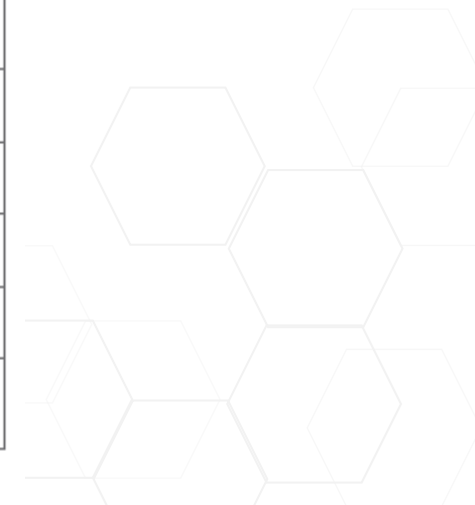
## ROLE OF CARDIAC CT ACROSS PHASES OF THE CARE PATHWAY



\*Guideline Directed Medical Therapy

# MYTH #2 – CTA IS AN ‘EXCHANGE OF’ TECHNOLOGY

	Median for CCTA Top Quartile Groups	N (by measure) for CCTA Top Quartile	Median for Non-Top Quartile Groups	N (by measure) for Non-Top Quartile
	2021		2021	
<b>Patient Panel Size per Practice Designated Physician</b>	1,734	17	1,890	125
<b>Total Cardiac CCTAs per 1,000 Active Patients</b>	54	17	6	47
<b>Total Nuclear SPECT per 1,000 Active Patients</b>	88	17	89	111
<b>Total Stress Echos per 1,000 Active Patients</b>	21	17	8	107
<b>Total Catheterizations per 1,000 Active Patients</b>	63	17	64	111
<b>Total PCIs per 1,000 Active Patients</b>	29	17	25	103
<b>Ratio of Total PCIs to Total Catheterizations</b>	42.13%	17	38.62%	112
<b>Ratio of Total CCTAs to Total New Patient Visits</b>	14.07%	17	2.35%	51
<b>Ratio of Total Nuclear SPECT to Total New Patient Visits</b>	23.15%	17	24.87%	119
<b>Ratio of Total Catheterizations to Total New Patient Visits</b>	17.60%	17	19.38%	121



# CTA IS AN 'EXCHANGE OF' TECHNOLOGY

## Summary – CTA group had:

- ✔ Virtually no change to SPECT volumes between the groups
- ✔ Slight decrease in SPECT to new patient ratio
- ✔ Increase in use of stress echo
- ✔ Increase in cath volumes
- ✔ Increase in PCI to cath ratio

# MYTH #3 – CTA VALUE IS CHALLENGING TO QUANTIFY

Study	Metric	Outcome
<b>CAT-CAD Randomized Trial<sup>13</sup></b> <b>CONSERVE<sup>14</sup></b>	Reduction of diagnostic cost per case with CCTA as the first-line diagnostic test	CAD diagnosis = 50-63% (\$1,448) cost reduction per patient CAD diagnosis + treatment = 55% (\$3,750) cost reduction per patient CAD diagnosis + therapy = 37% (\$2,303)
<b>DEWEY ET AL 2016<sup>15</sup></b>	Reduction in length-of-stay (LOS)	Shortened median LOS by 43% (22.9 hours)
<b>ENVINCI<sup>16</sup></b>	Improved diagnostic yield with addition of CCTA for low-risk patients	Combined non-invasive strategies with CCTA and stress-imaging are cost-effective gatekeepers to invasive coronary angiography
<b>CCTA and FFR<sub>CT</sub><sup>17</sup></b>	Adding FFR <sub>CT</sub> to CCTA improves time to treat and quality of management compared to CCTA alone	Adding FFR <sub>CT</sub> to CCTA changed decision making in 65% of patient cases and reduced time to definitive investigation by an average of 16 days
<b>CCTA and FFR<sub>CT</sub><sup>18</sup></b>	Adding FFR <sub>CT</sub> to CCTA increases diagnostic cath yield for revascularization two times compared to traditional care	Adding FFR <sub>CT</sub> to CCTA had fewer false negatives and 78% more likely to identify patients in need of revascularization which in turn created a significant increase in diagnostic cath yield for revascularization



# WHAT MIGHT MY PROGRAM EXPECT?

## USE CASE SUMMARY

The following chart summarizes use cases with volume, reimbursement, operational and revenue considerations.

Use Case	Volume Considerations	Reimbursement Considerations	Operational Considerations	Revenue Opportunities
<b>CAC Scoring and Plaque Analysis</b>	Prevention programs and direct to patient engagement	Direct pay with downstream revenue from follow-on testing	Simple, quick scan with option for high patient throughput	+
<b>CCTA for CAD</b>	Embed CT-first strategy into chest pain assessment – emergency department, primary care, cardiology	Combination of incremental growth and transition from other modalities	Key to economic viability is throughput and access – CT pathway and protocols drive reliable use and outcomes	+
<b>CCTA with FFR<sub>CT</sub></b>	Expect 30-35% add to CCTA	Payer reimbursement is variable – Check with MAC and local payers	See CCTA considerations	0
<b>Non-CAD Vascular</b>	Vascular disease diagnosis and pre-procedure planning	Payer reimbursement similar to CCTA	Incremental volumes to new program with improved access to CT driving increased volumes. Improved efficiency of interventional vascular procedures with pre-procedure CTA.	++
<b>Structural Heart/ LAAO and Adult Congenital</b>	Review of historic patient volumes for each program – # of CT referrals	Payer reimbursement similar to CCTA with added cardiac anatomy assessment	Incremental volumes to new program with improved access to CT driving increased volumes	++





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# ECONOMIC DOSSIER:

## FINANCIAL IMPACT OF CARDIAC CT

For the Cardiovascular Service Line

With Support From:



ECONOMIC  
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# KEY TAKE AWAYS

- CTA use is **expanding**
- CTA use is **not** an ‘**exchange** of technology’ strategy
- Programs with best clinical and economic outcomes develop a **organization-wide plan** through identified **use cases** and appropriate **operational infrastructure** to assure efficiency and access
- Overall **economic** impact is **positive** when implemented widely and effectively

**Thank you**

**Ginger Biesbrock, DSc, PA-C, FACC**  
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**Q&A**

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