

30TH ANNIVERSARY CARDIAC SURGERY SYMPOSIUM · NYP QUEENS

AI in Cardiovascular Medicine

Where We Are Now

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November 21, 2026



Image: Siemens Healthineers

Disclosures

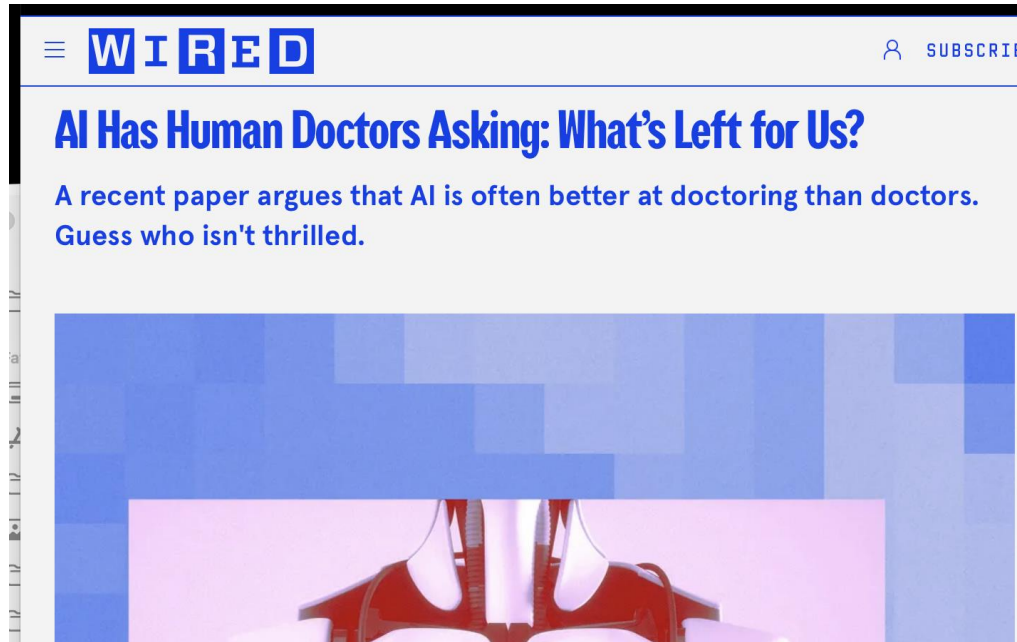
Medtronic – Consultant

Shockwave – Consultant

GSK – Advisory Board

AI was utilized in the creation of this presentation

Are we the last generation?!



Elon Musk @elonmusk · Aug 7, 2025

AI is already better than most doctors. That's the honest truth.

And it will become far better.

Same for all jobs tbh, including mine.

403

257

2.6K

272K

Elon Musk says AI surgeons will be better than humans in just three years

Musk is 'too optimistic', with years of comparative testing required before robots can work on humans, an expert says

Harry Cockburn

Thursday 08 January 2026 13:48 EST



Comments



LIAT CLARK

BUSINESS

SEP 4, 2012 9:00 AM

Vinod Khosla: Machines will replace 80 percent of doctors

The Evolution of Doctoring

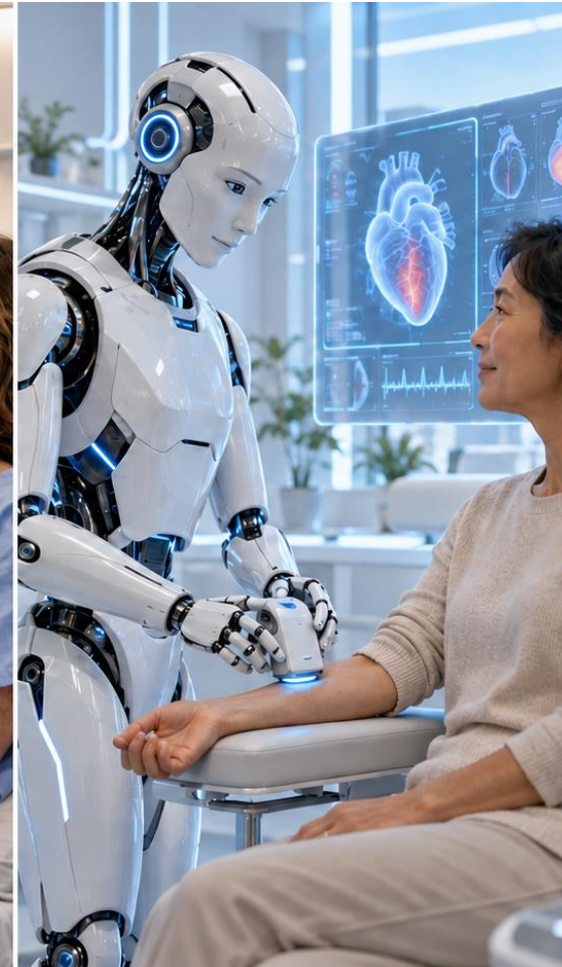
PAST



PRESENT



FUTURE?



AI Won't Be Replacing Cardiologists or Surgeons



AI is Already Impacting Cardiovascular Care



FIND

Screening

AI-ECG surfaces
disease nobody
ordered a test for



SEE

Imaging

CT and echo read
for physiology,
plaque and
inflammation



PLAN

Planning

Automated
measurement and
predictive
simulation



TREAT

Procedures

Wire-free
physiology,
automated IVI, real-
time guidance

203

FDA-cleared cardiology AI algorithms as of March 2026: second only to radiology. The question is no longer whether AI is in the pathway, but where it changes a decision.

Cardiology AI is already on your patient's wrist

The Apple Watch: the "iPhone 1" of cardiovascular AI

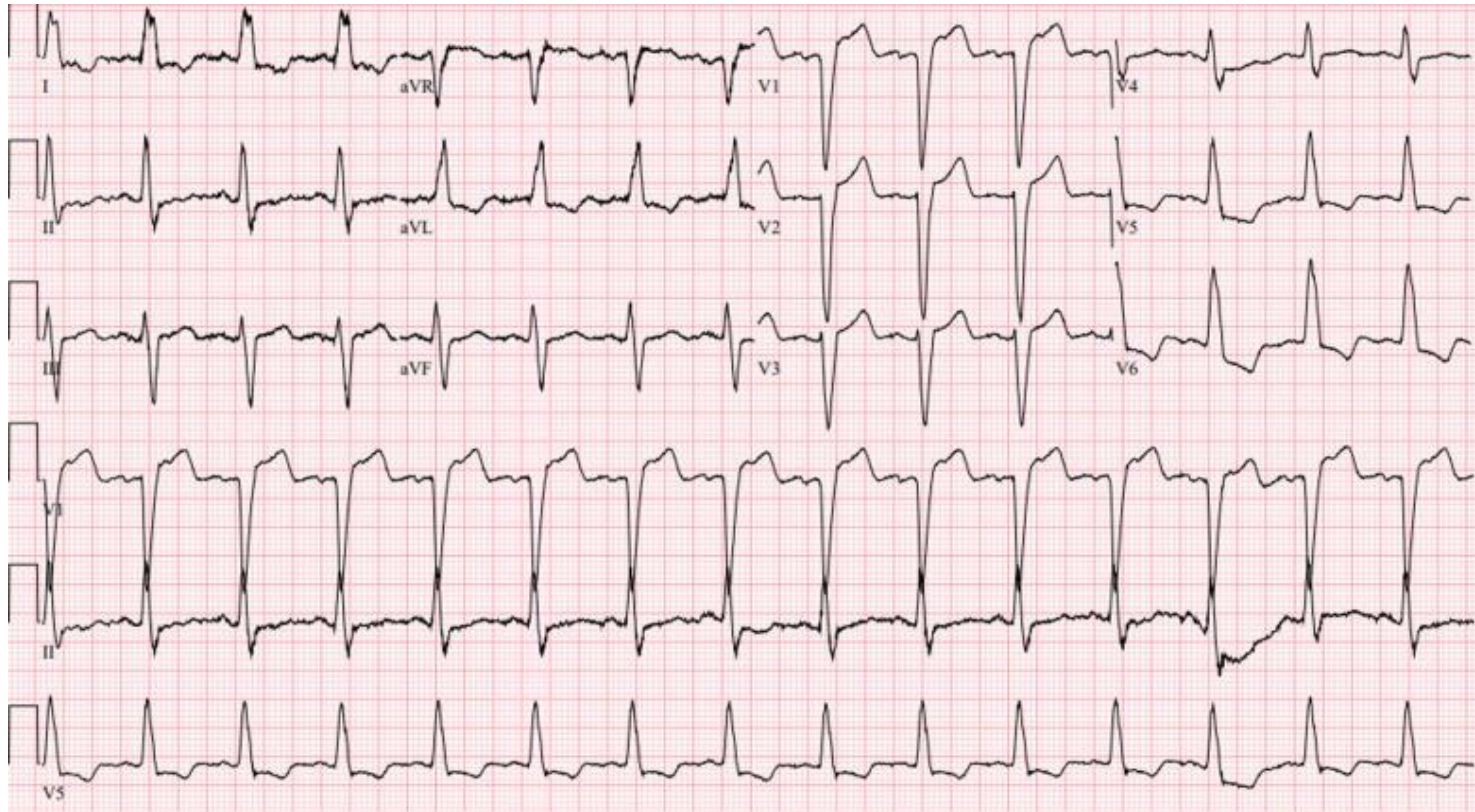
- **2018** FDA clears the ECG app and irregular-rhythm notification
- **2019** Apple Heart Study enrolls 419,297 people from their phones
- **2022** AI on a single-lead watch ECG detects low EF (AUC 0.88)
- **2024** FDA qualifies AFib History as a clinical-trial tool
- **2025** Hypertension alerts cleared; >1 million expected in year one

Still unproven: whether wrist screening prevents strokes or deaths (Heartline RCT pending).



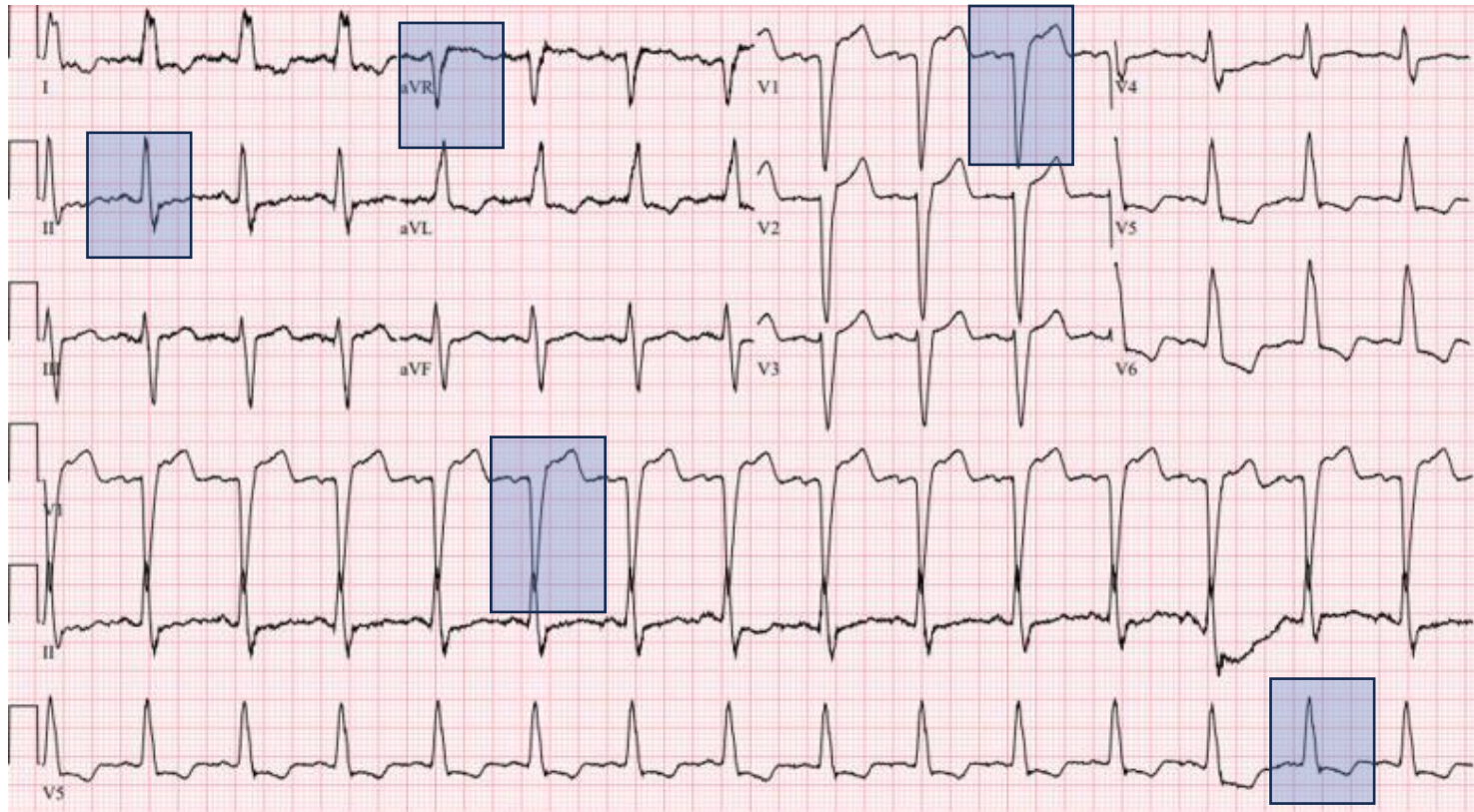
ECG – The Simplest Cardiac Test

84-year-old woman • hip fracture • no cardiac symptoms

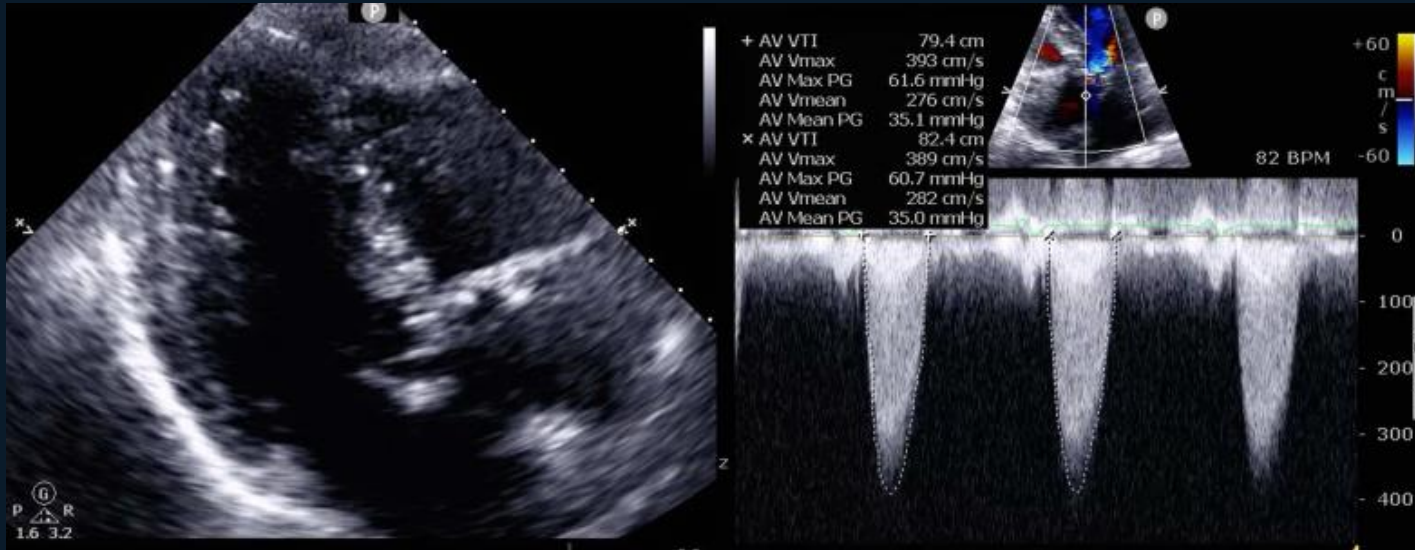


ECG – The Simplest Cardiac Test

84-year-old woman • hip fracture • no cardiac symptoms



AI Algorithm Alert → Diagnosis of Valve Disease



Severe aortic stenosis

Found by an algorithm

Treated within days

Nobody was looking for her valve. The algorithm was.

EchoNext: how AI learns from ECGs

Developed at NewYork-Presbyterian and Columbia

Development dataset: 1.2 million ECG–echo pairs • 230,000 patients • 8 NYP hospitals

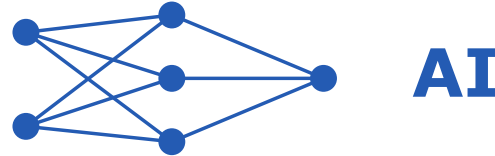
1 Match ECG + echo



ECG = input
Echo result = answer



2 Train the AI



Learn ECG patterns linked
to structural heart disease



3 Test on new patients



Test in NYP and 3 other
health systems

In practice

New ECG



AI risk score



Consider an echocardiogram

Screening identifies risk; echocardiography confirms the findings.

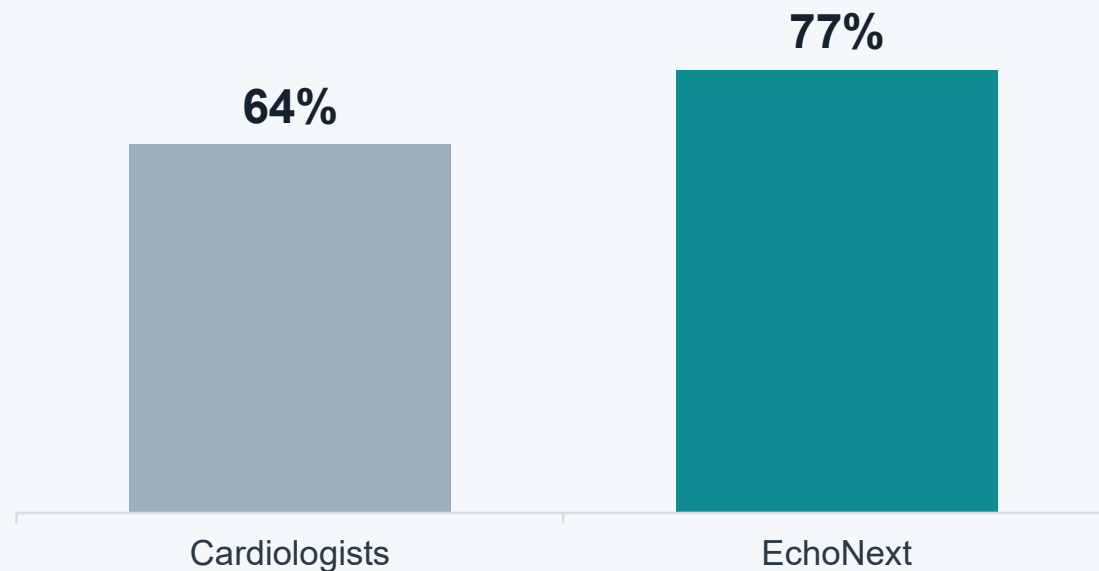
A 12-lead ECG can screen for structural heart disease

EchoNext (Columbia / NYP): a deep-learning ECG model, trained on 1.2 million ECG–echo pairs

77%

of structural heart disease detected,
vs 64% for cardiologists (same 3,200 ECGs)

Structural heart disease detected



FDA-cleared July 2026; free to clinicians via OpenEvidence.

In practice, the flags were real

85,000 patients without a prior echo, screened prospectively

~75%

of flagged patients who had an echo
had structural heart disease

9%

of screened patients were flagged
as high risk

Roughly twice the usual echo yield. Every flag still becomes an echo.

45-year-old man discharged
from the ED on inhalers

ED trial ECG read by EchoNext ·
transplanted at NYP / Weill Cornell
six months later

The New York Times

Doctors Thought It Was Asthma. A.I. Flagged a Serious Heart Problem.

Artificial intelligence programs can spot patterns in electrocardiograms that humans miss. Now, one program is going to be widely available — for free — to doctors.

Listen · 5:48 min

Share full article



A clinical trial using an A.I. program found evidence of possible severe heart damage in the electrocardiogram of a 45-year-old patient. Jessica Rinaldi/Reuters

"Asthma" → AI-ECG flag → LMNA cardiomyopathy → Transplant

SEE

AI in echo: automated analysis and reporting

EchoNet-Dynamic (research)

LV volumes, ejection fraction

PanEcho (research)

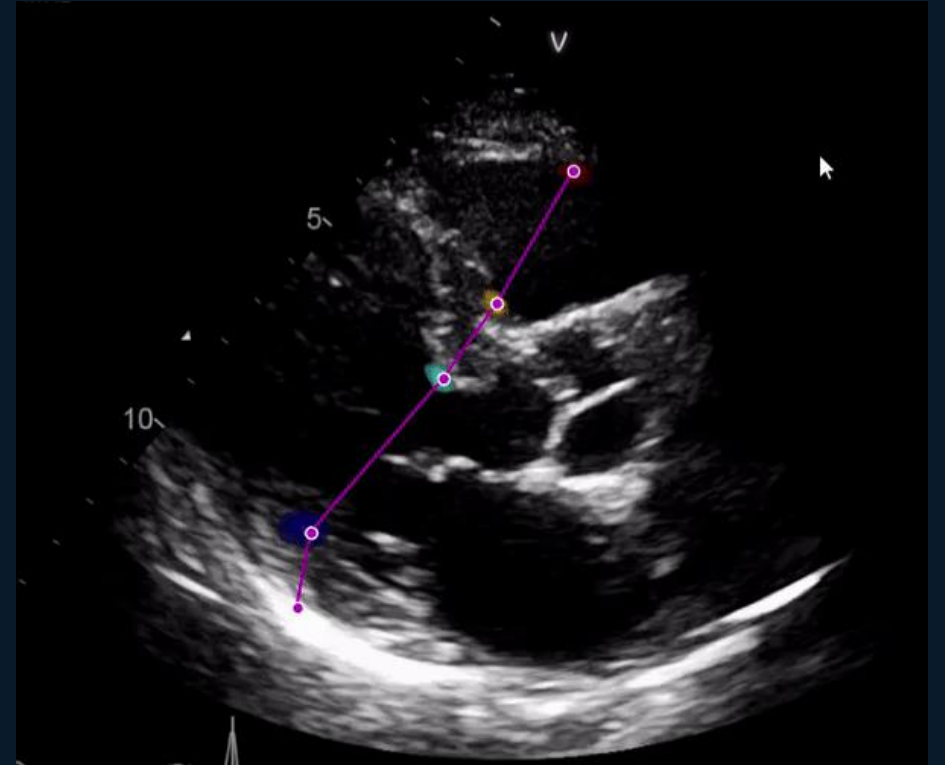
39 tasks, including EF, RV function and valve disease

EchoPrime (research)

Combines multiple views into a preliminary interpretation

Us2.ai (clinical product)

Automated measurements, Doppler and structured reports



Example: automated Us2.ai report

SEE

AI can improve the first echo read

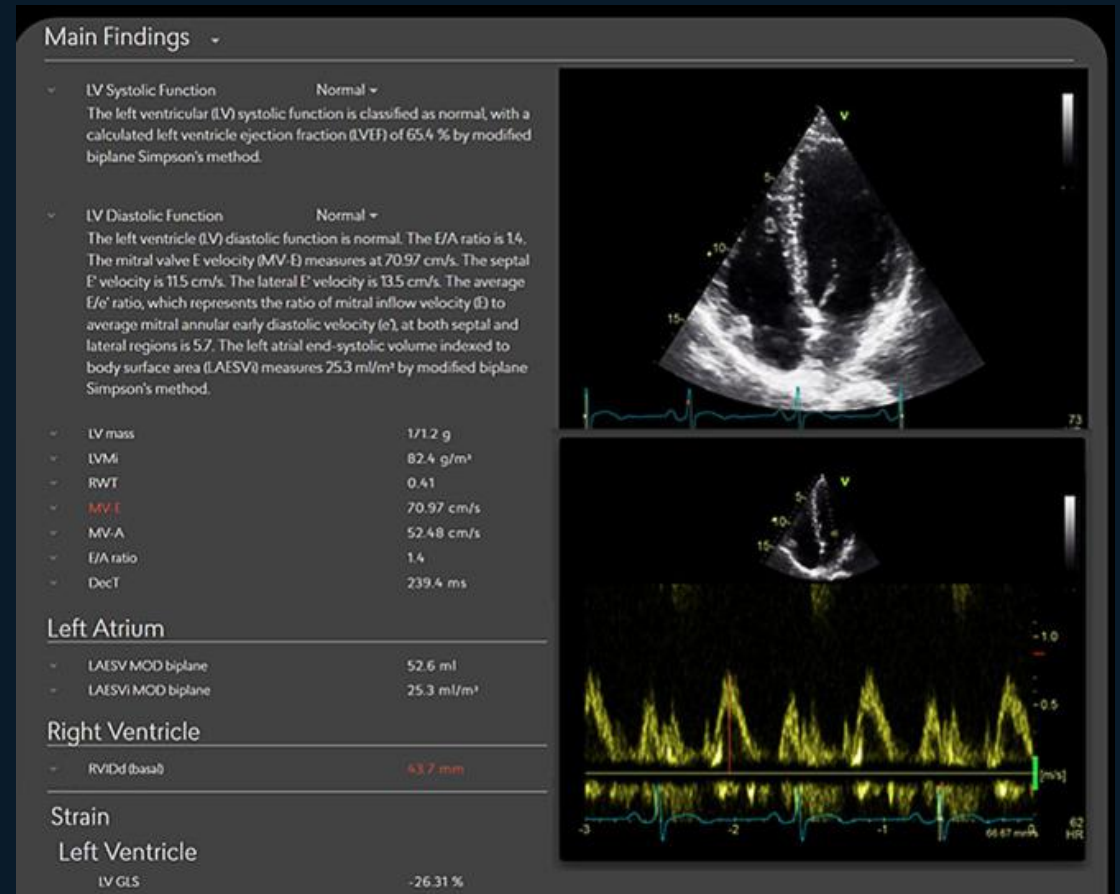
EchoNet: randomized EF trial

Cardiologist less likely to correct EF of AI read vs. Sonographer read

Sonographer first read  **27.2%**

AI first read  **16.8%**

Fewer substantial corrections after the AI first read
 $P < .001$ for superiority on this endpoint



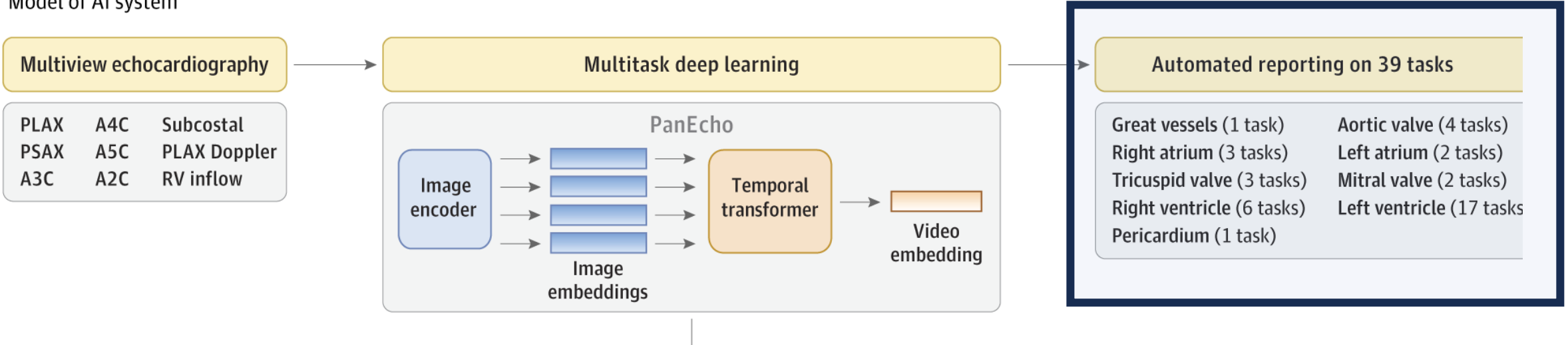
Complete AI-Enabled Echocardiography Interpretation With Multitask Deep Learning

Gregory Holste, MSE^{1,2,3}; Evangelos K. Oikonomou, MD, DPhil^{2,3}; Márton Tokodi, MD, PhD⁴; [et al](#)

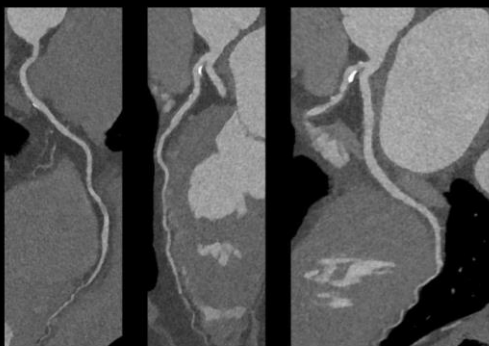
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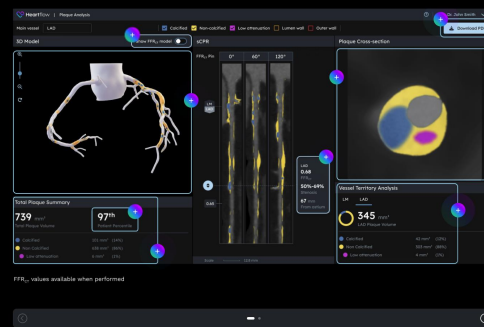
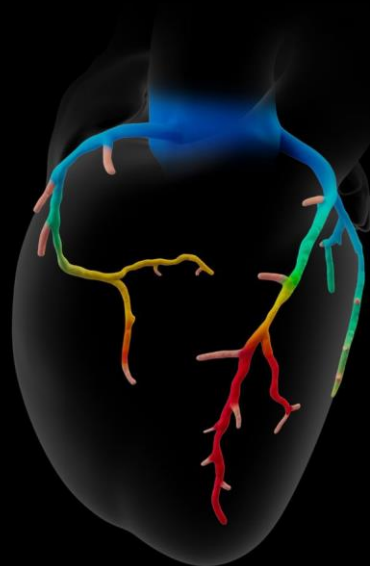
B Model of AI system



AI in Coronary CTA – Beyond Anatomy



0.4 mm | Bv48 | 70 keV



ANATOMY

Stenosis & distribution

PHYSIOLOGY

CT-derived FFR

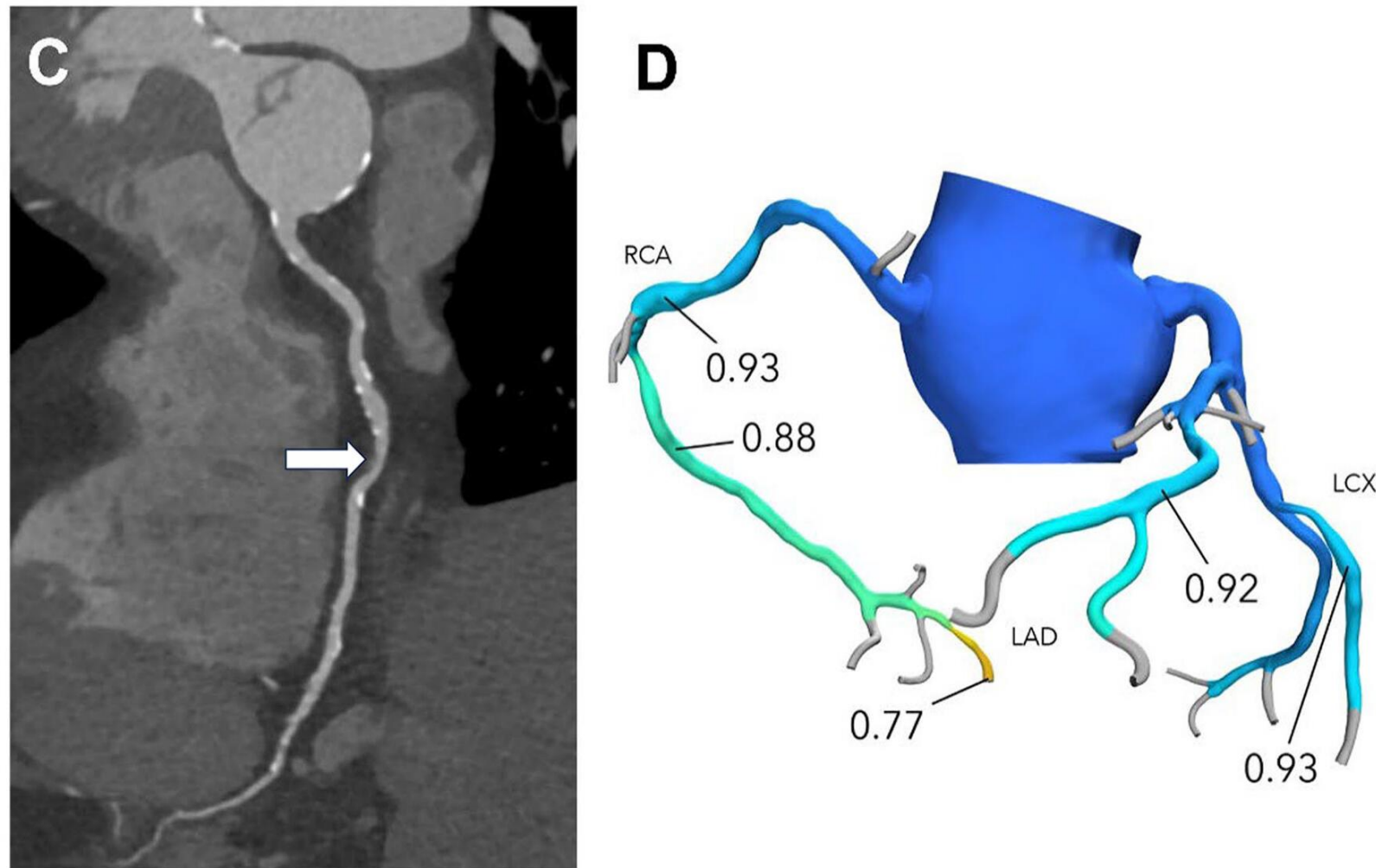
PLAQUE

Volume & composition

INFLAMMATION

Perivascular fat attenuation

CT-derived FFR – Multiple algorithms for this

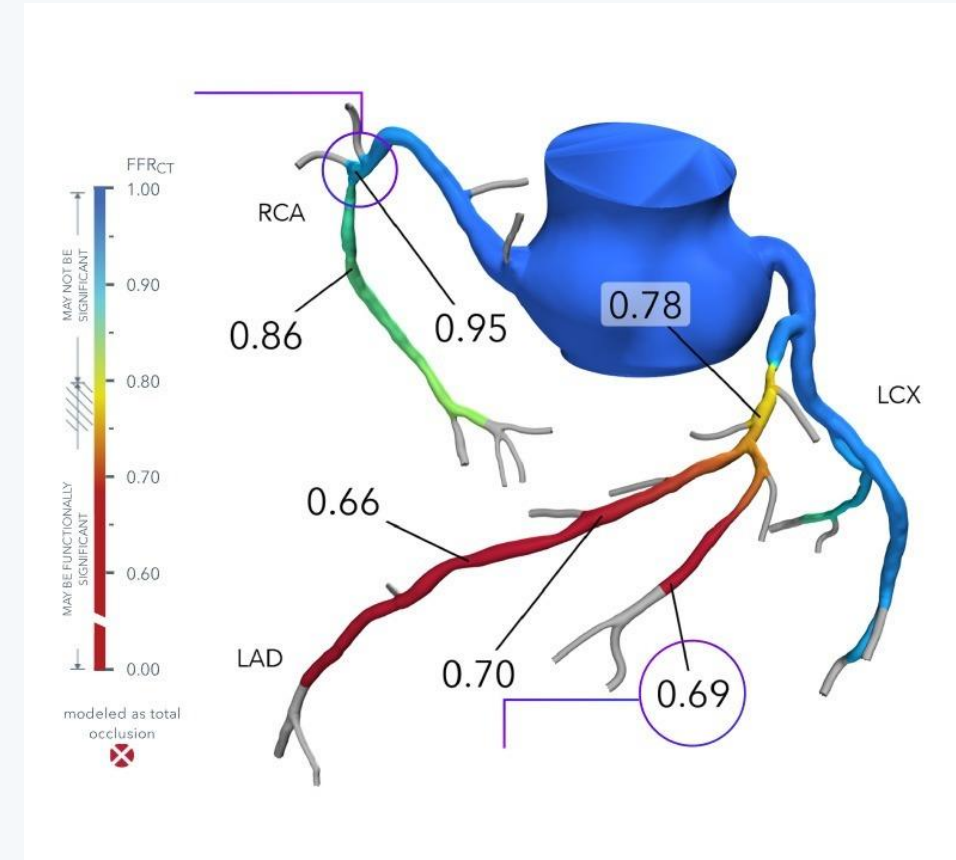
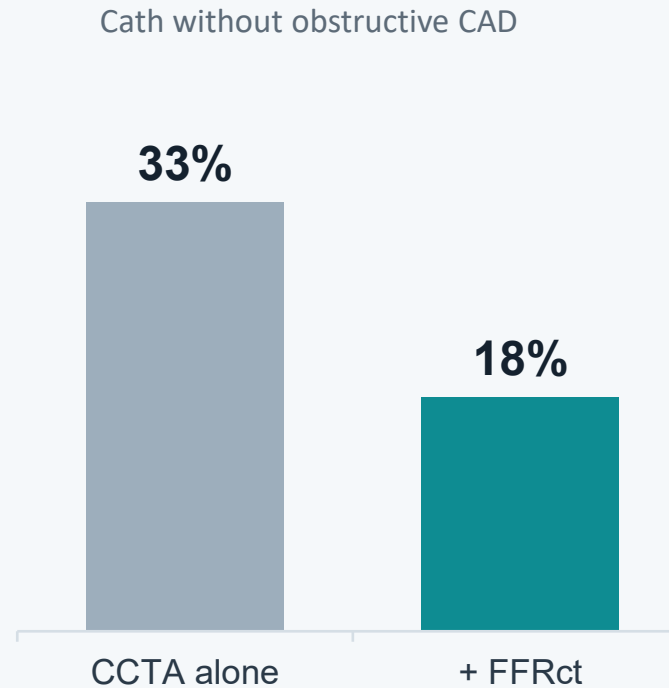


CT-derived FFR cuts unnecessary catheterization

FUSION randomized trial: 528 patients with >50% stenosis on CCTA

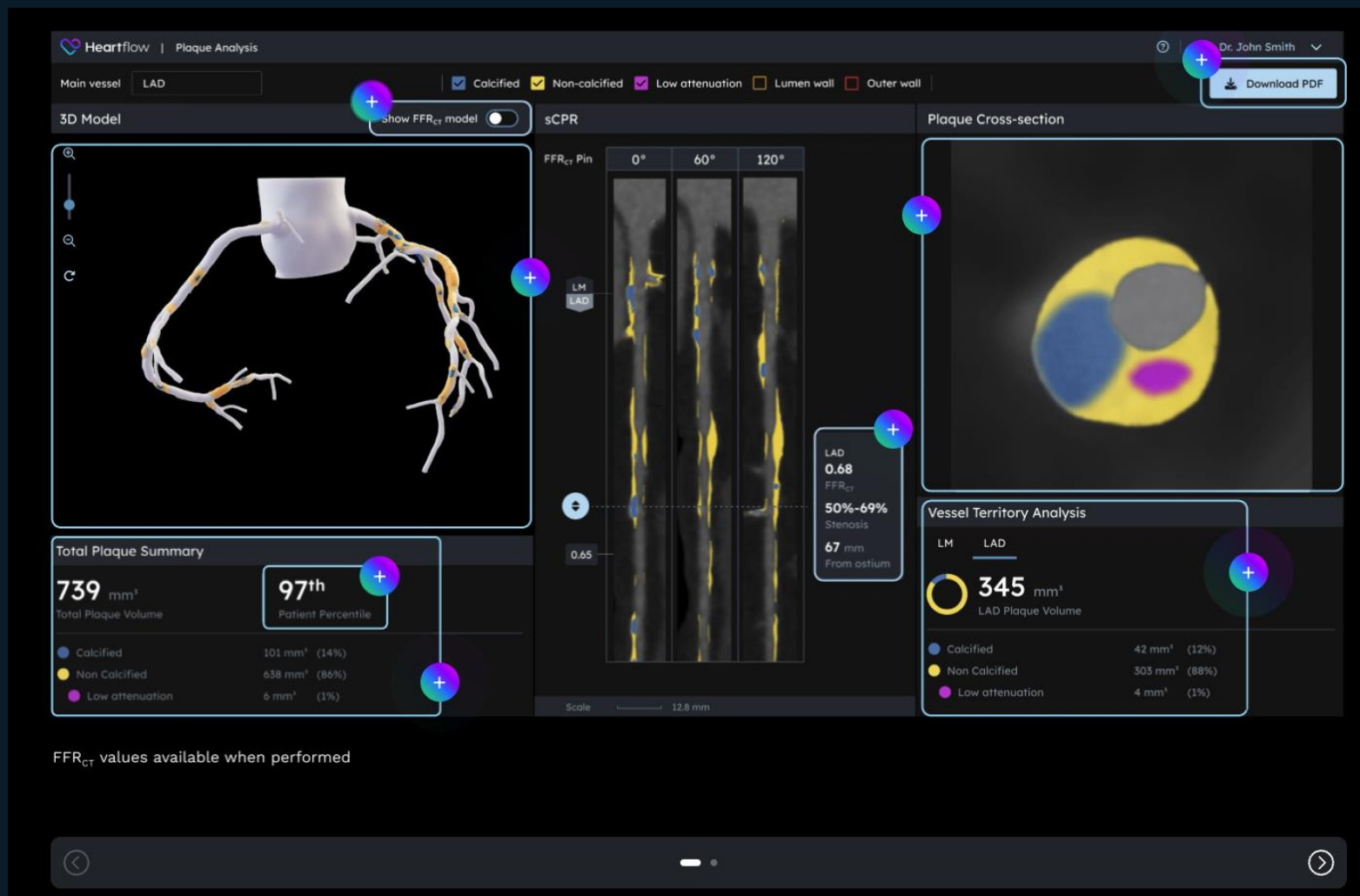
-44%

invasive angiography without obstructive CAD at 90 days



Revascularization at 1 year: 20% in both groups. Overall ICA 61% → 43%.

Plaque analysis – Composition and Risk

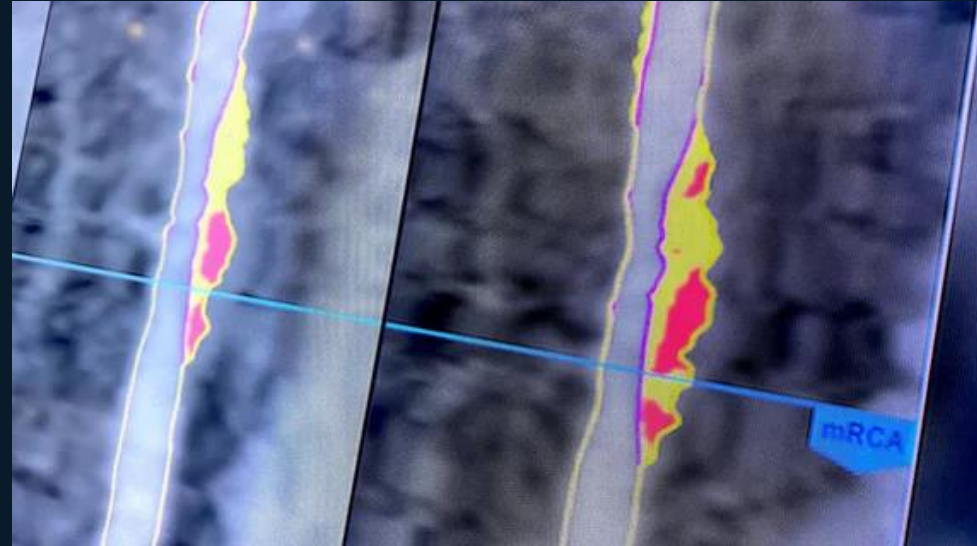


Plaque analysis may impact management

HeartFlow DECIDE registry

>50%

of patients had treatment changed
after AI plaque analysis

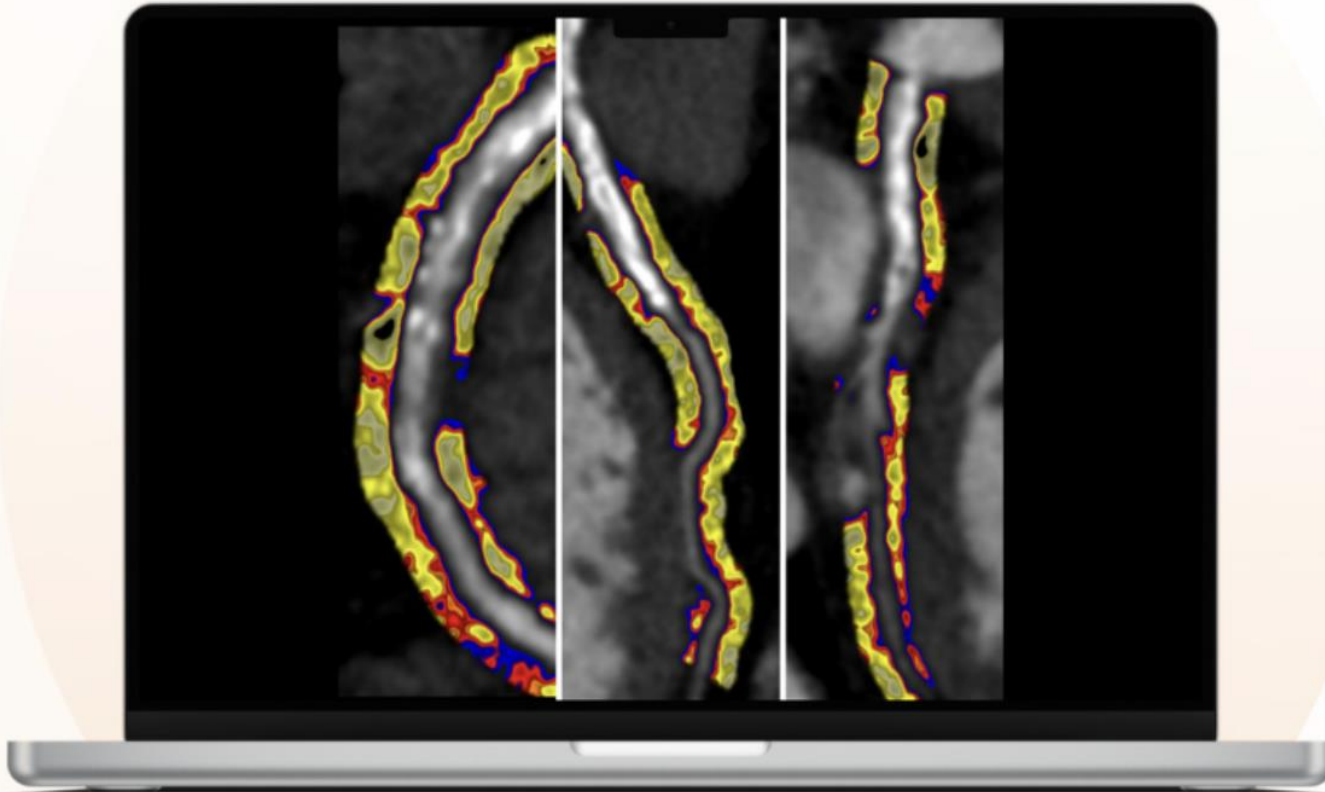


Future: Identifying / Following High Risk Plaques pre-MI

Medicare now covers AI plaque analysis. Management change is not the same as fewer events.

CaRi-Heart: the artery's inflammatory signal

First US-authorized tool to quantify coronary inflammation from routine CCTA (FDA De Novo, July 2026)



Fat Attenuation Index

10-year cardiac risk

From a routine CCTA

About half of first heart attacks occur in patients labeled "low risk."

Inflammation helps predict future cardiac events

ORFAN: CaRi-Heart AI-Risk validation in 3,393 patients, median follow-up 7.7 years

6.75x

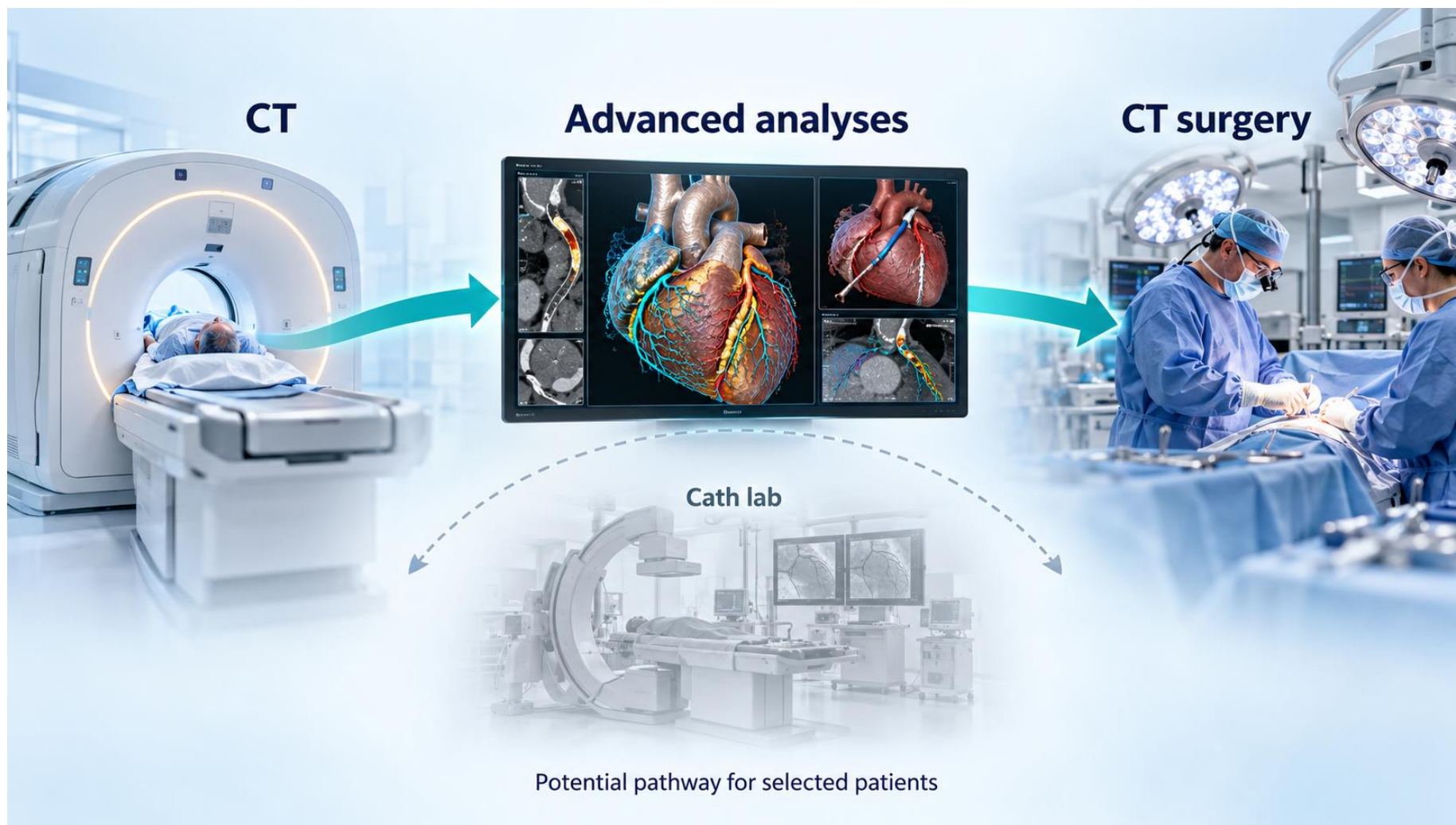
hazard of
cardiac death

4.68x

hazard of major adverse
cardiac events

Risk prediction beyond routine factors and CAD extent. Event prevention remains unproven.

The Future?



AI Software can automate structural measurements

TAVR, mitral, tricuspid and LAA planning in one cloud workflow



Segmentation

Annulus & coronary heights

Calcium & access

DASI simulates the valve before it is deployed

FDA-cleared, patient-specific TAVR simulation from the planning CT



Supports planning; it does not choose the device.

Annular rupture

Coronary obstruction

Paravalvular leak

Redo TAV-in-TAV

[Full PrecisionTAVI demo ►](#)

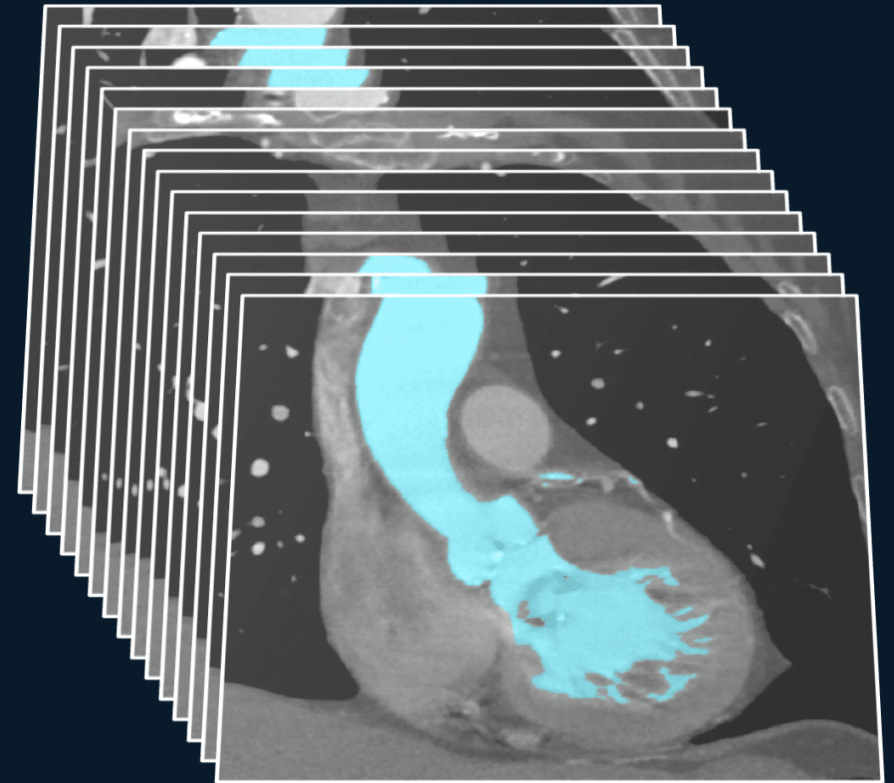
Predict Current and Future Procedures

TAVR

Device fit, obstruction risk, future access, redo TAVR

SAVR

Sizing, Durability, Future ViV

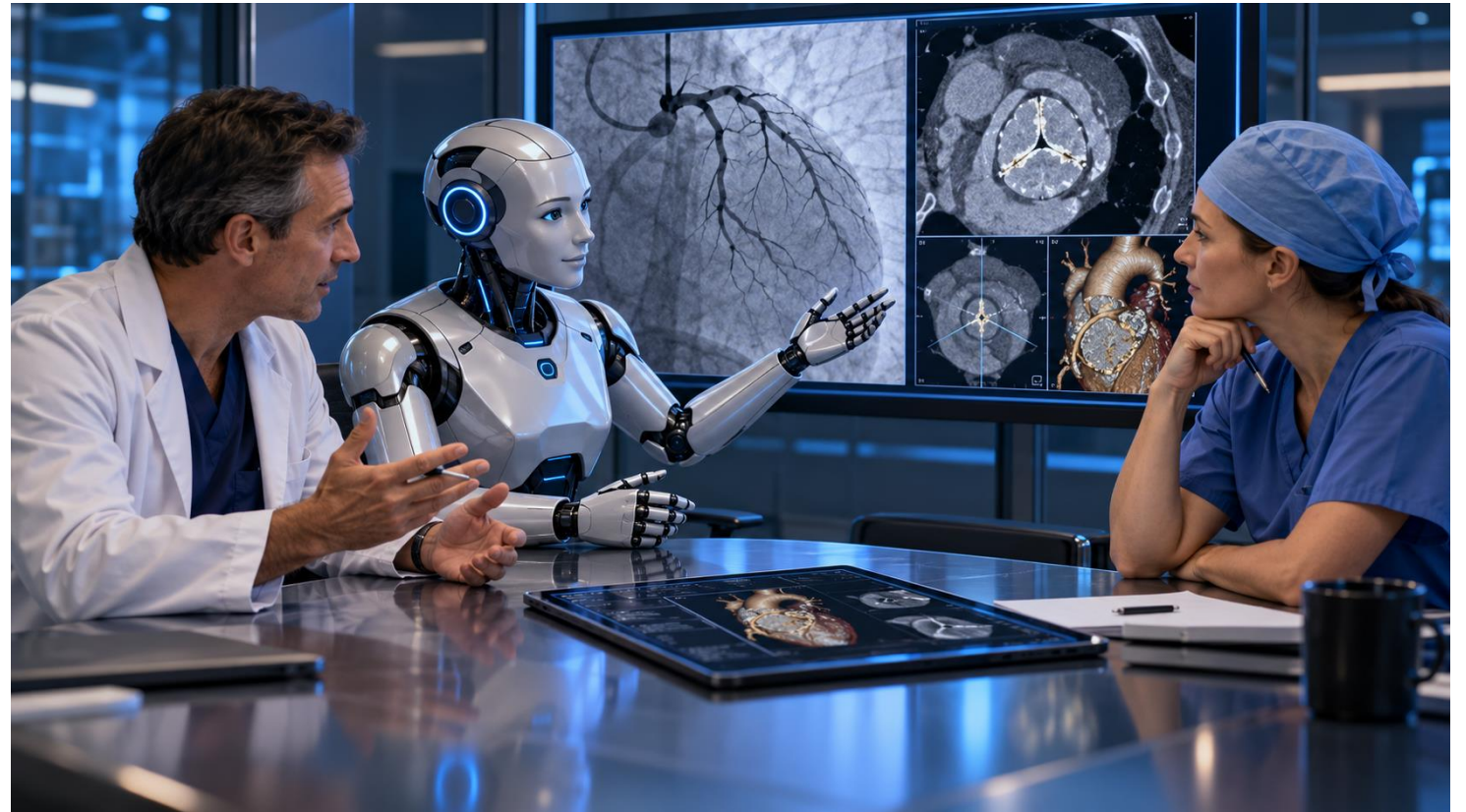


LLMs can apply Heart Team decision rules

A pilot study of 40 written coronary and valve cases

40/40

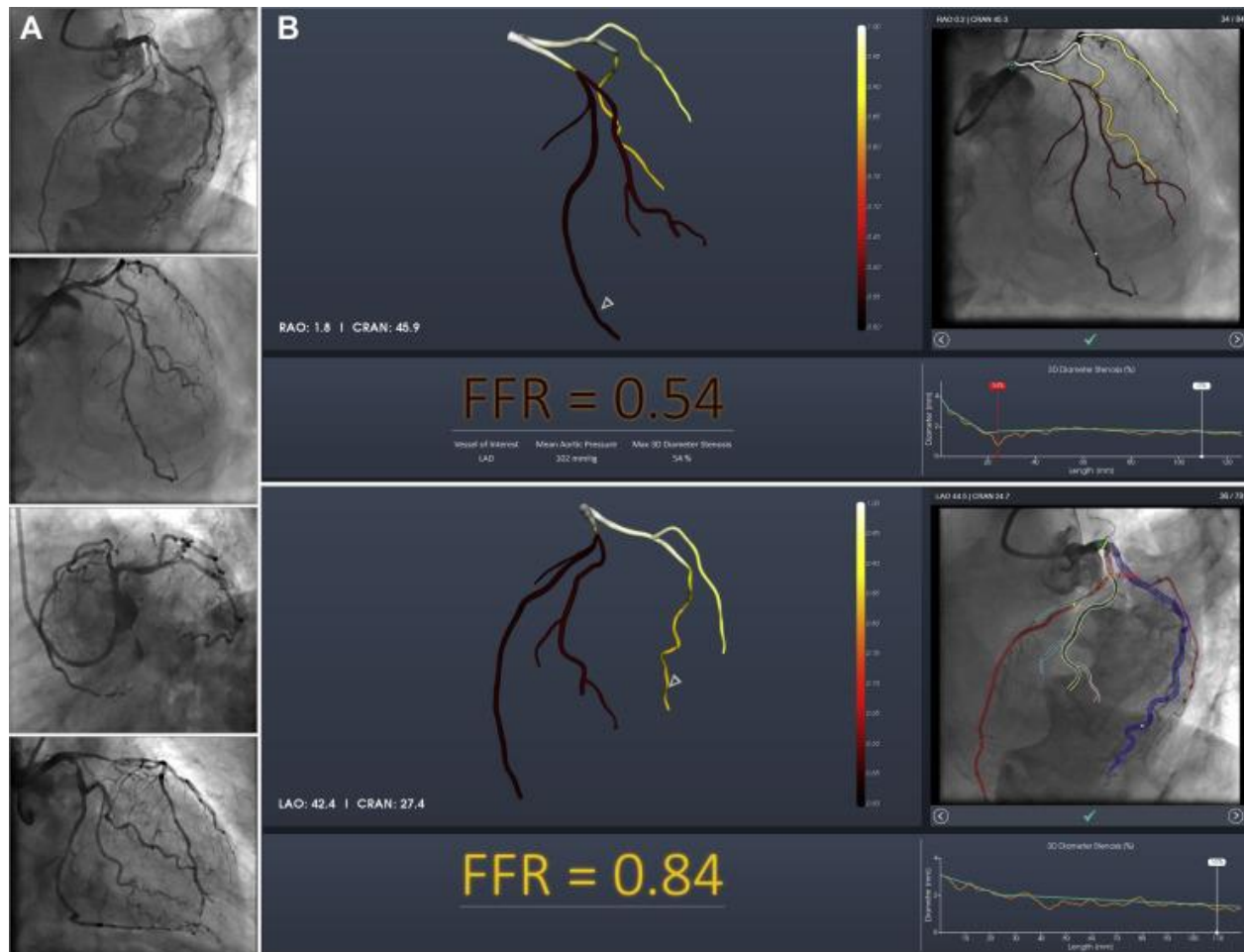
GPT-4 classifications
agreed with the
guideline standard



Written vignettes only. The study did not test real-time patient care or outcomes.

Conceptual illustration. Heart Team vignette study: JACC Cardiovascular Interventions 2024.

In the Cath Lab: Angiography can yield physiology

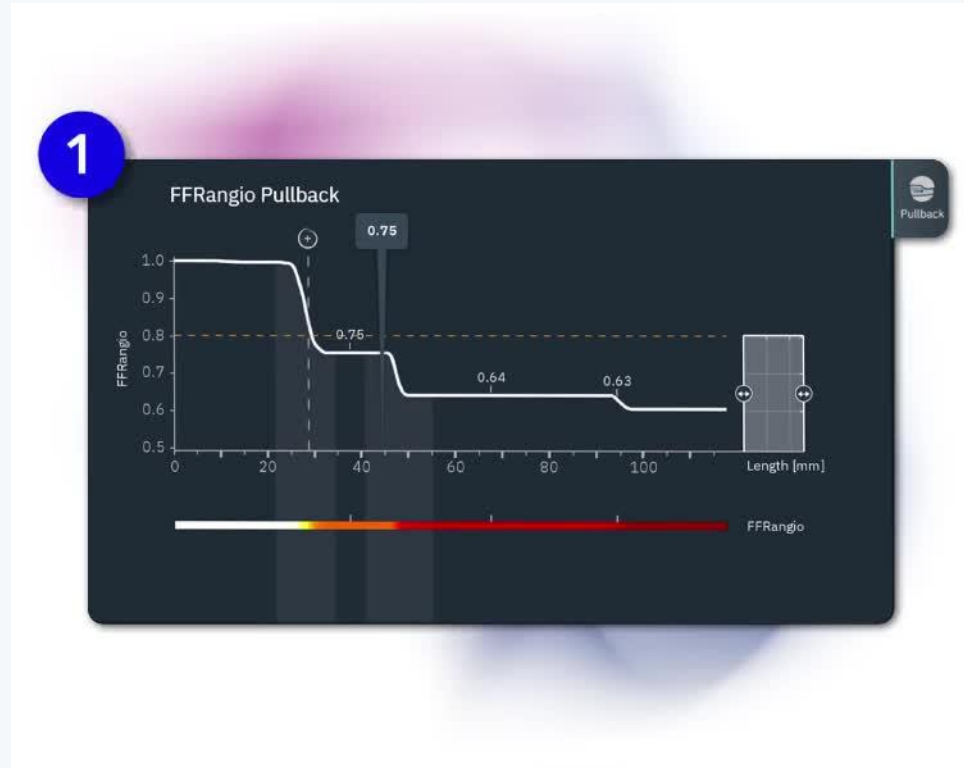


- CathWorks FFRangio
- X1 FFR
- QFR

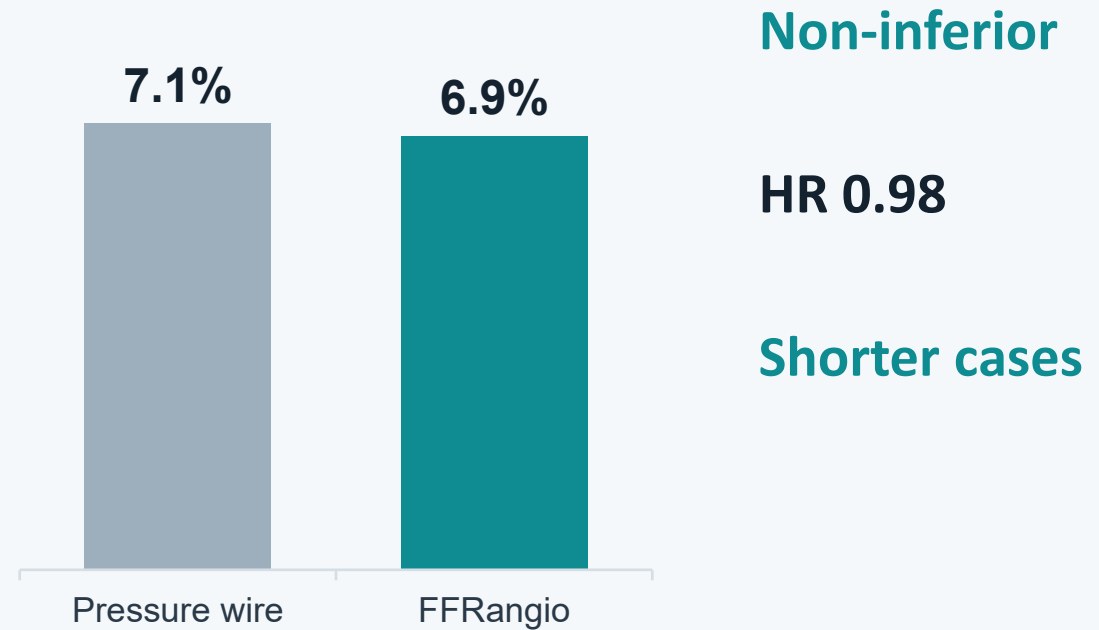
87-93% diagnostic accuracy vs wire FFR

Wire-free physiology matched the pressure wire

ALL-RISE randomized trial: 1,930 patients, FFRangio vs pressure wire



1-yr death / MI / revasc



Physiology from the diagnostic angiogram gives the Heart Team a functional SYNTAX score.

OCT analysis at procedural speed

Automated calcium detection

Automatic Lipid Detection

Automatic Vessel Sizing

Expansion Check



Live echo views follow the repair device

Philips DeviceGuide fuses 3D TEE with fluoroscopy during mitral TEER



Auto-tracks the device

FDA-cleared Mar 2026

51 procedures at 4 centers; teams found it helpful in 69%. No control group.

AI in cardiology: what we gain, what comes next

What AI gives us now

Earlier detection, faster triage, leveraged imaging
Enhanced procedural planning

What AI still lacks

Dependable performance across populations
Clinical context and judgment, Implementation

Where we need to go

External validation and prospective trials of patient benefit,
cost effectiveness

Our jobs are safe for now.

Elon's Robots won't be taking over.....



Instead – It will be helping us for years to come....



Questions

Ali Haider, MD · NewYork-Presbyterian Queens · Weill Cornell Medicine



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