

# CT Angiography vs Nuclear Stress Which is the Better Test?

*For What?*

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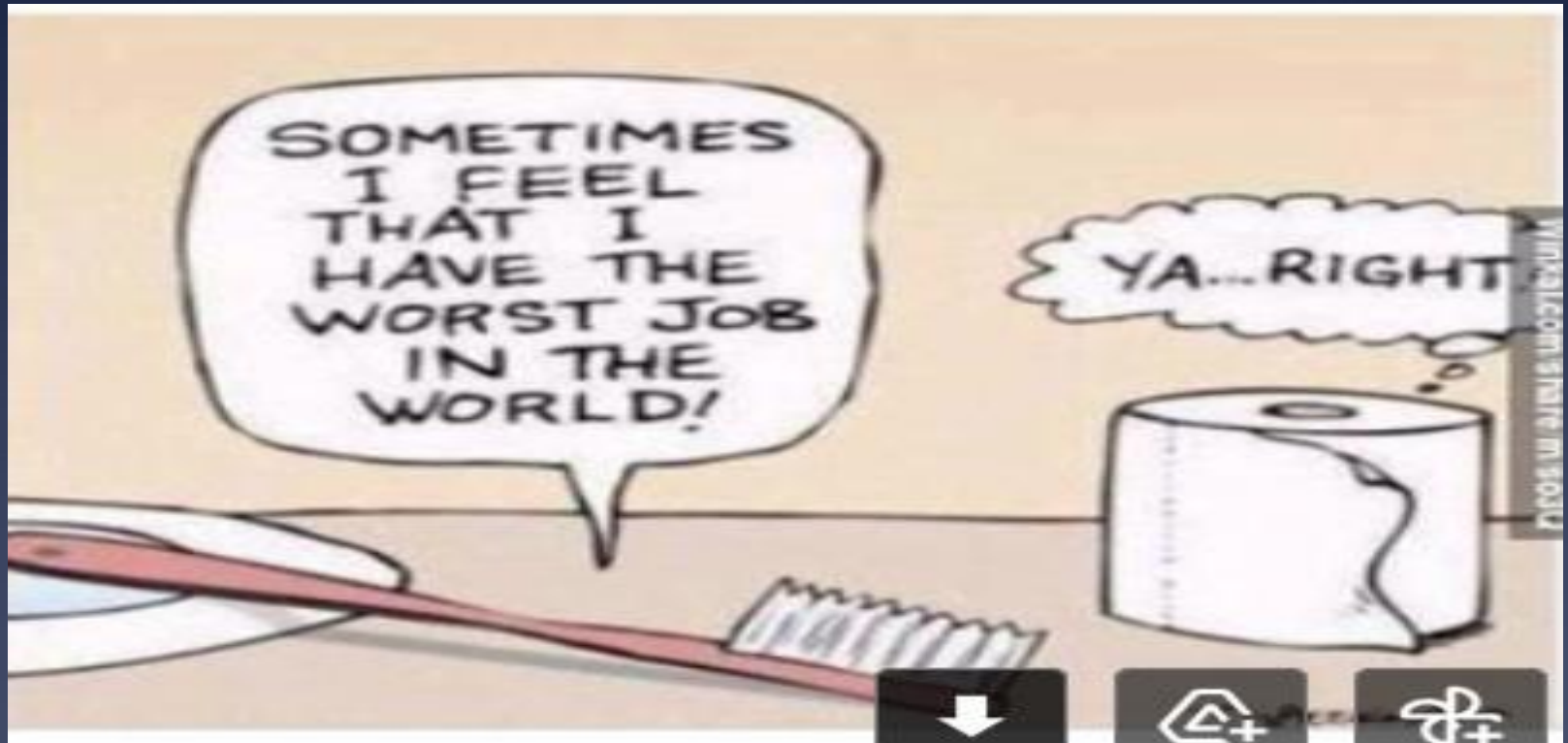
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# Next Years Debate Topic: Worst Job in the World



# What Does A Nuclear Stress Test Report

- \* Exercise performance if treadmill performed
- \* Regional perfusion abnormalities
  - \* Reversible vs Fixed
    - \* Perfusion abnormalities represent regions of decreased blood flow and not ischemia
- \* Does have predictive abilities to determine risk of cardiovascular events

# What Does A CTA Report? A Lot More Than Pretty Pictures

- \* The presence or absence of coronary plaque
- \* The severity (stenosis) of coronary plaque
- \* Plaque morphology
  - \* High risk features such as fatty plaque, negative remodeling
- \* Coronary artery anomalies
- \* Cardiac function/infarct detection
- \* Assessing other causes of cardiac symptoms such as pulmonary emboli, thoracic aortic aneurysm

# What Decisions Can This Effect?

- \* Intensity of lipid lowering therapy
- \* Need for anti-platelet therapy
- \* Need for revascularization and avoiding the oculo-stenotic reflex when disease is discovered in the cardiac catheterization laboratory

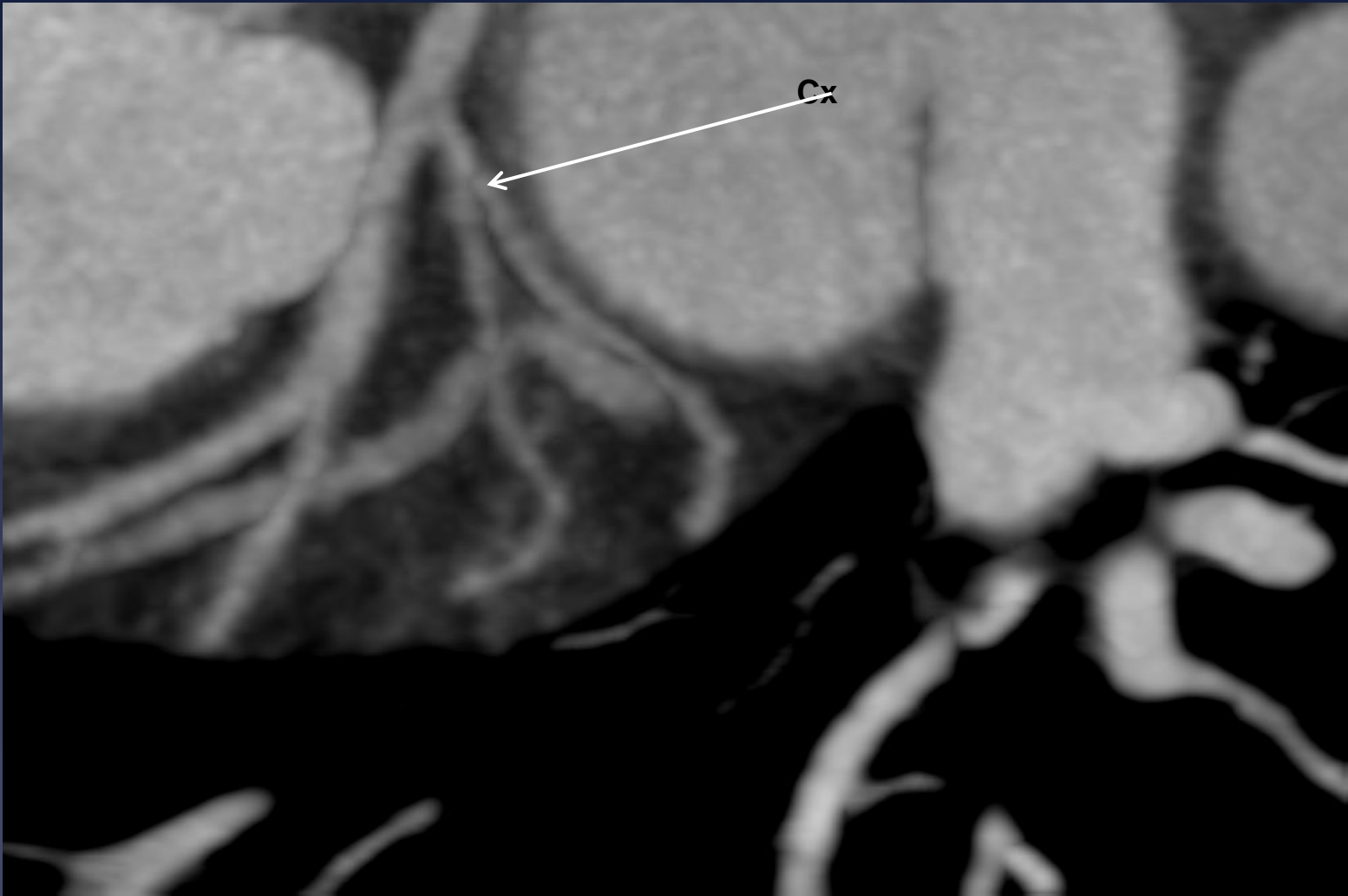
# So What Kind of Questions Do We Ask?

- \* Does this patient have coronary artery disease?
- \* Is my patient high risk?
- \* Should the patient be on a statin and/or aspirin?
- \* Can I personalize lipid lowering goals?
- \* What is the cause of the patients chest discomfort?

72yo F

LM/LAD





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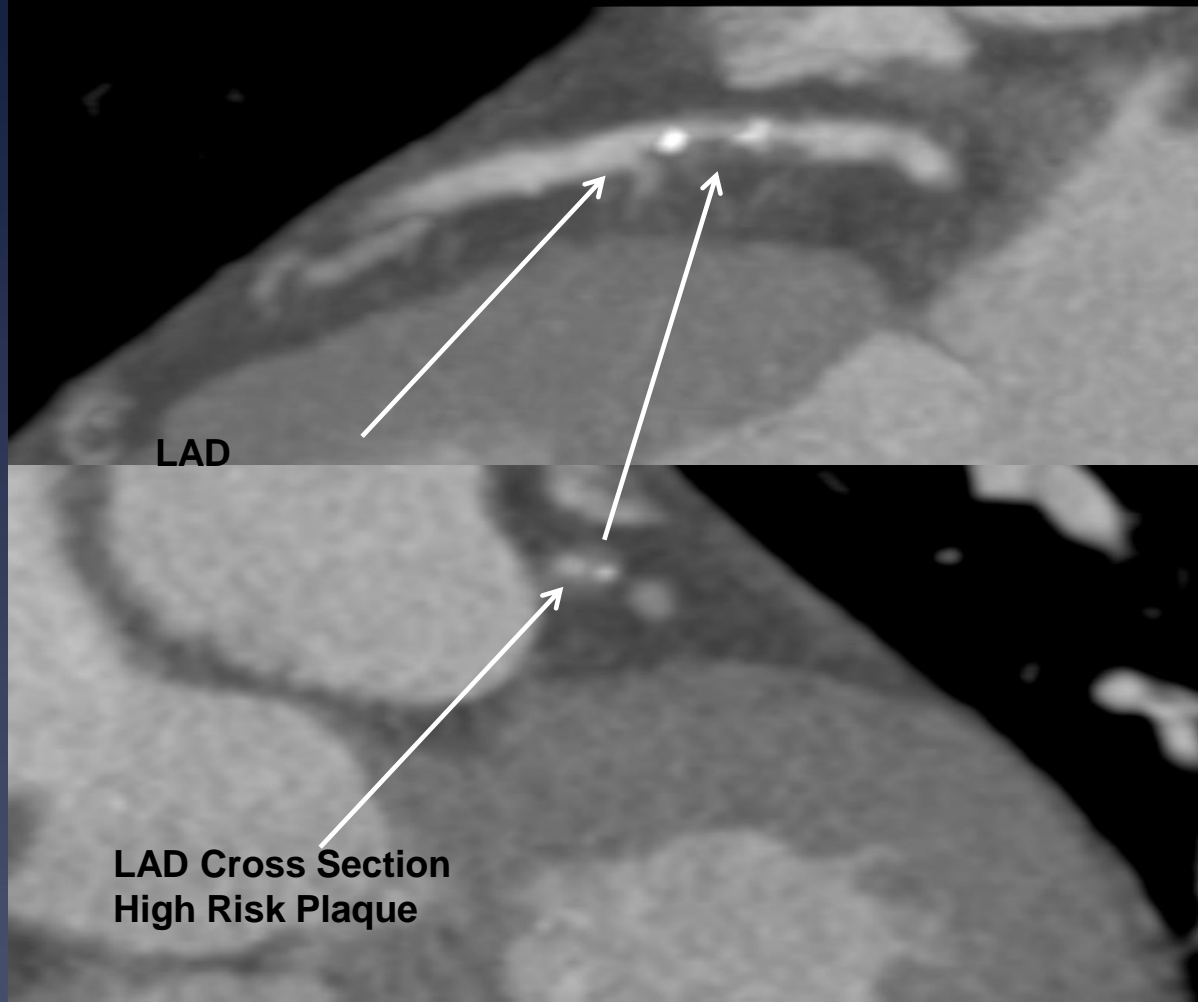


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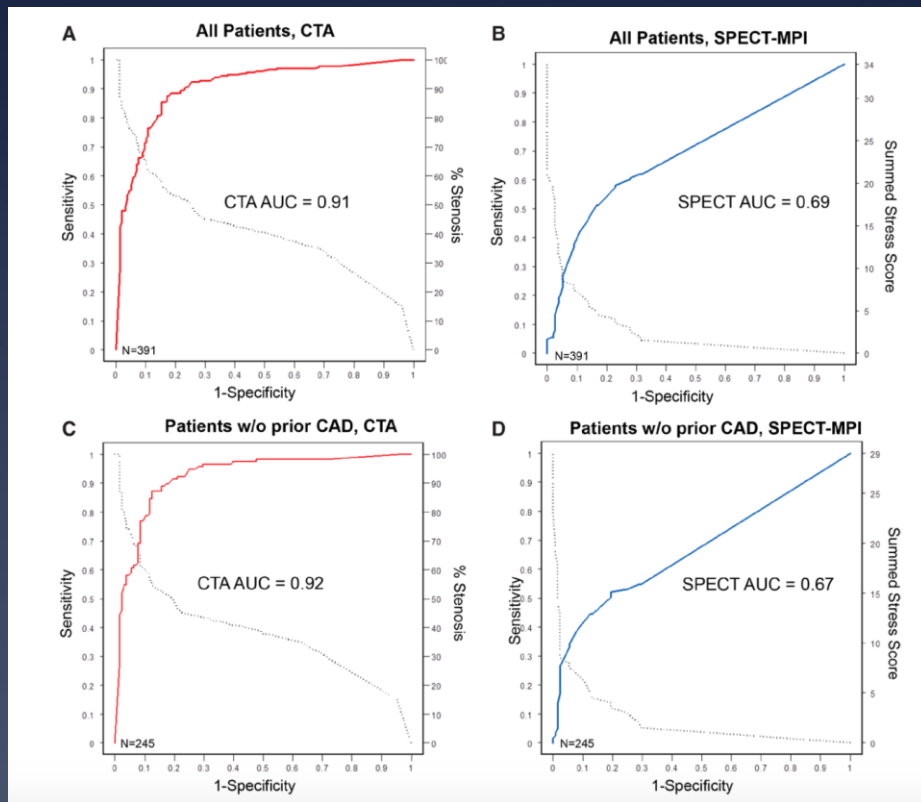


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# Sensitivity and Specificity of CCT vs SPECT



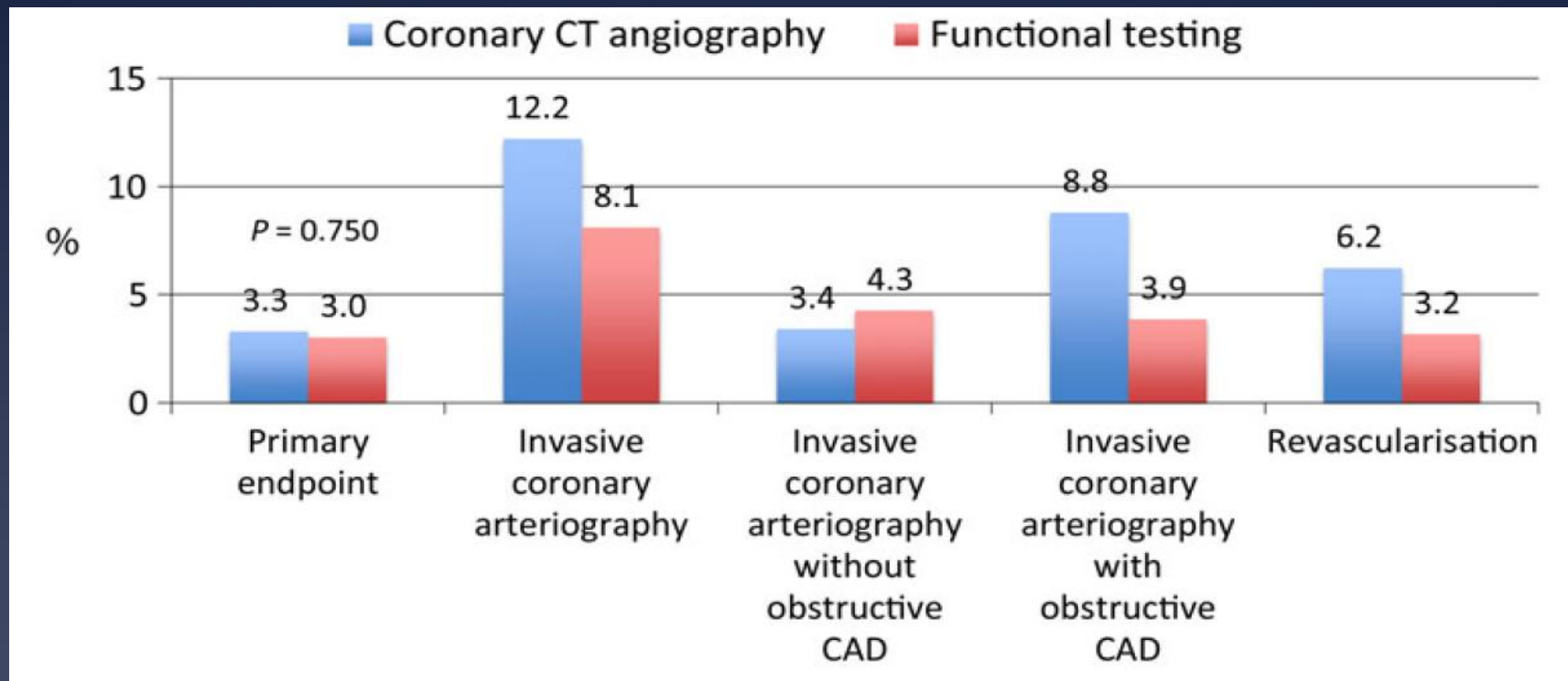
# Overall Diagnostic Accuracy

	All (n=391)			No Previous CAD (n=245)		
	CTA	SPECT	<i>P</i> Value	CTA	SPECT	<i>P</i> Value
AUC	0.91 (0.88–0.94)	0.69 (0.64–0.74)	<0.001	0.92 (0.89–0.96)	0.67 (0.61–0.73)	<0.001
Sensitivity	216/234	145/234	<0.001	107/117	64/117	<0.001
Specificity	0.92 (0.88–0.95)	0.62 (0.55–0.68)	0.23	0.91 (0.85–0.96)	0.55 (0.45–0.64)	0.08
	117/157	107/157		103/128	90/128	
PPV	0.75 (0.67–0.81)	0.68 (0.60–0.75)	0.001	0.80 (0.73–0.87)		<0.001
	216/256	145/195		107/132	64/102	
NPV	0.84 (0.79–0.89)	0.74 (0.68–0.80)	<0.0001	0.81 (0.73–0.87)	0.63 (0.53–0.72)	<0.001
	117/135	107/196		103/113	90/143	
Disease prevalence	0.87 (0.80–0.92)	0.55 (0.47–0.62)		0.91 (0.84–0.96)	0.63 (0.54–0.71)	
	0.60			0.48		

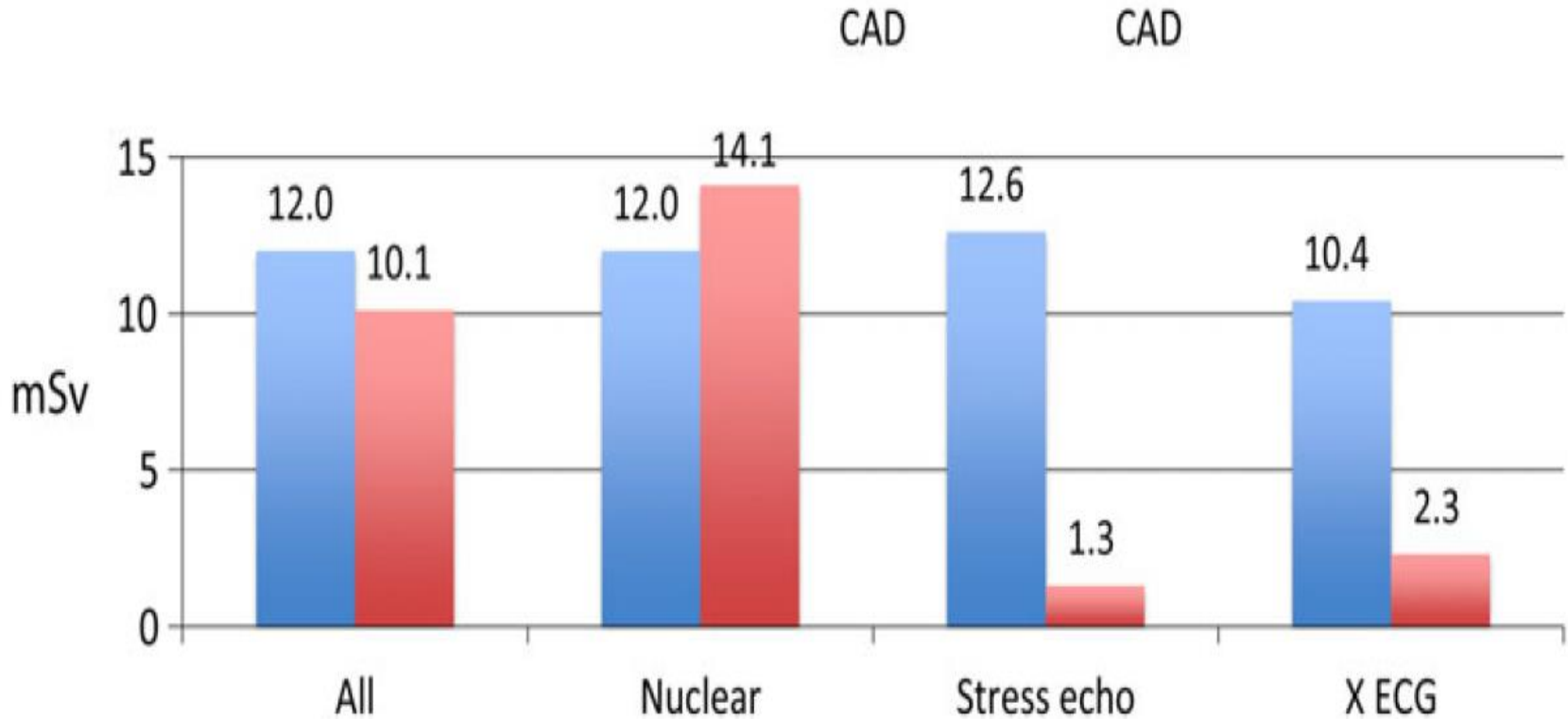
# Diagnostic Accuracy CCTA vs Spect in Subgroups

Groups n (All, No Previous CAD)	All Patients			Patients Without Previous CAD		
	CTA	SPECT	PValue	CTA	SPECT	PValue
Obese patients (n=100, 72)	0.95 (0.91–0.99)	0.65 (0.55–0.76)	<0.001	0.95 (0.91–1.00)	0.62 (0.49–0.75)	<0.001
Nonobese patients (n=291, 173)	0.89 (0.85–0.93)	0.71 (0.65–0.76)	<0.001	0.91 (0.87–0.96)	0.69 (0.62–0.76)	<0.001
Calcium score, ≥400 (n=125, 66)	0.76 (0.61–0.91)	0.65 (0.51–0.79)	0.33	0.70 (0.49–0.92)	0.71 (0.58–0.83)	0.96
Calcium score, <400 (n=265, 178)	0.89 (0.85–0.93)	0.67 (0.61–0.73)	<0.001	0.91 (0.86–0.96)	0.60 (0.52–0.68)	<0.001
Exercise SPECT (n=126, 82)	0.90 (0.85–0.96)	0.60 (0.52–0.69)	<0.001	0.91 (0.84–0.98)	0.61 (0.50–0.72)	<0.001
Pharmacological SPECT (n=264, 162)	0.91 (0.87–0.94)	0.73 (0.67–0.78)	<0.001	0.93 (0.89–0.97)	0.69 (0.62–0.77)	<0.001
Research SPECT (n=231, 137)	0.90 (0.86–0.94)	0.72 (0.66–0.78)	<0.001	0.92 (0.87–0.98)	0.66 (0.60–0.78)	<0.001
Clinical SPECT (n=160, 108)	0.92 (0.88–0.97)	0.65 (0.58–0.73)	<0.001	0.92 (0.87–0.98)	0.69 (0.60–0.78)	<0.001

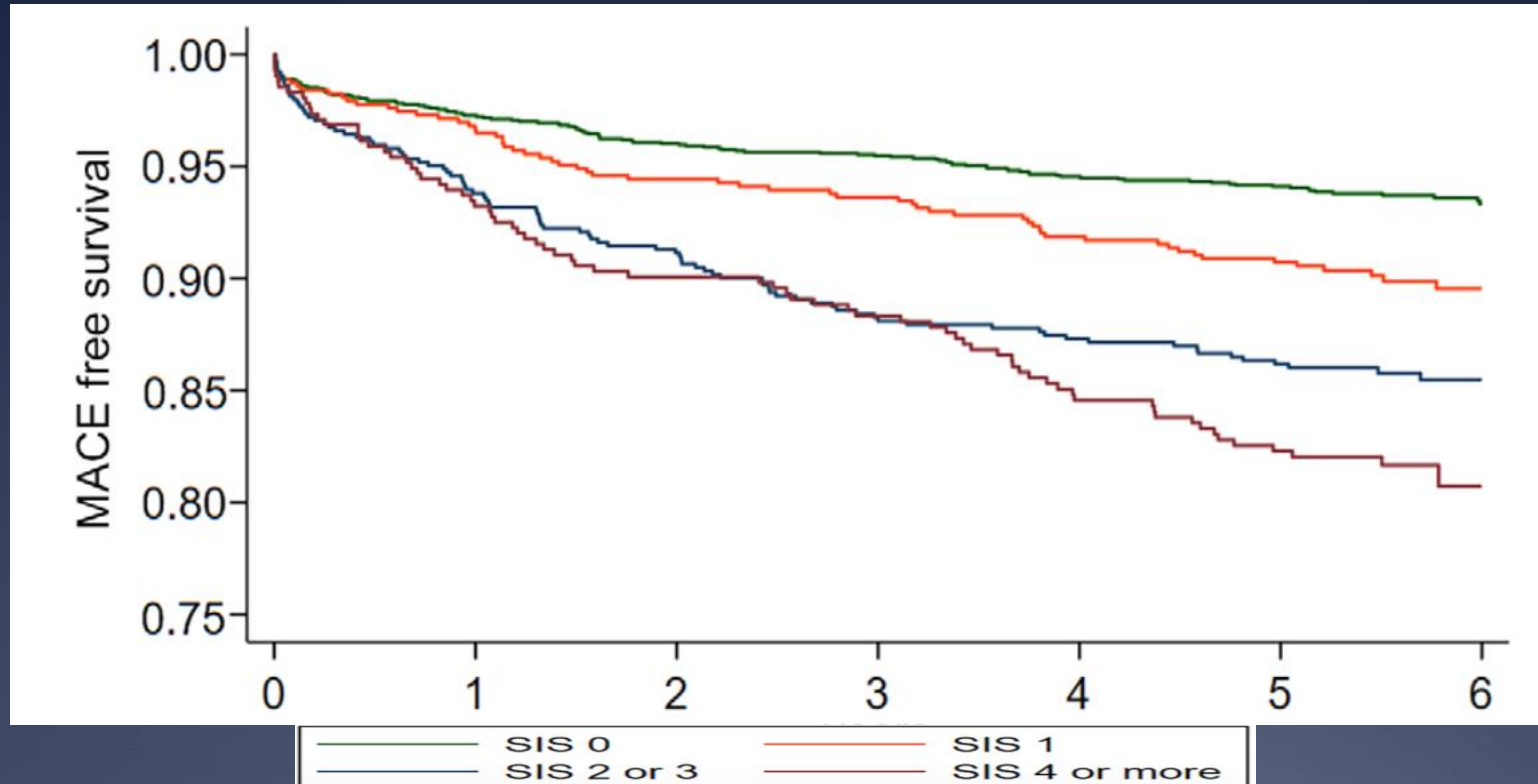
# Assessing Suspected Angina CTA vs Stress Testing



# X-Ray Exposure and Modality

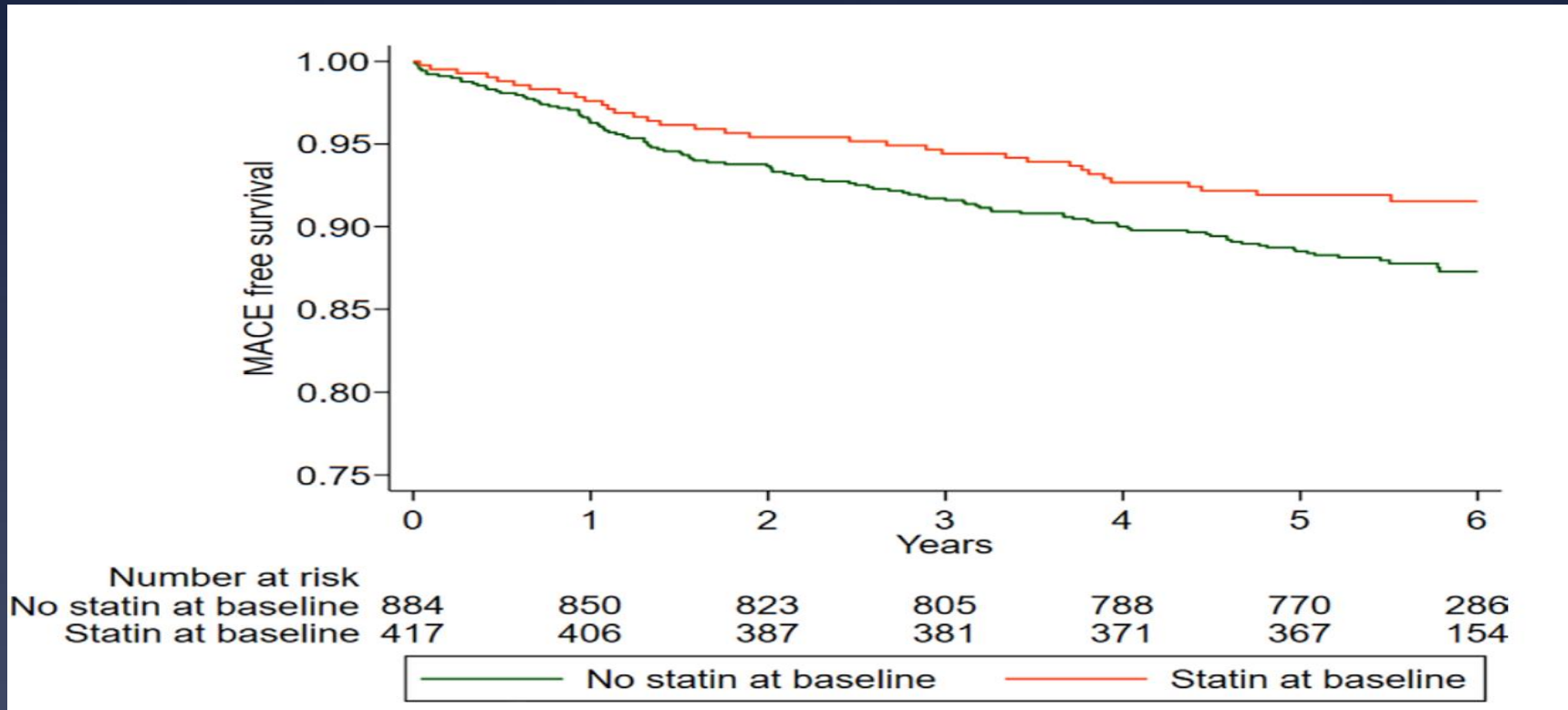


# MACE Free Survival Stratified By CAD Severity (CONFIRM)



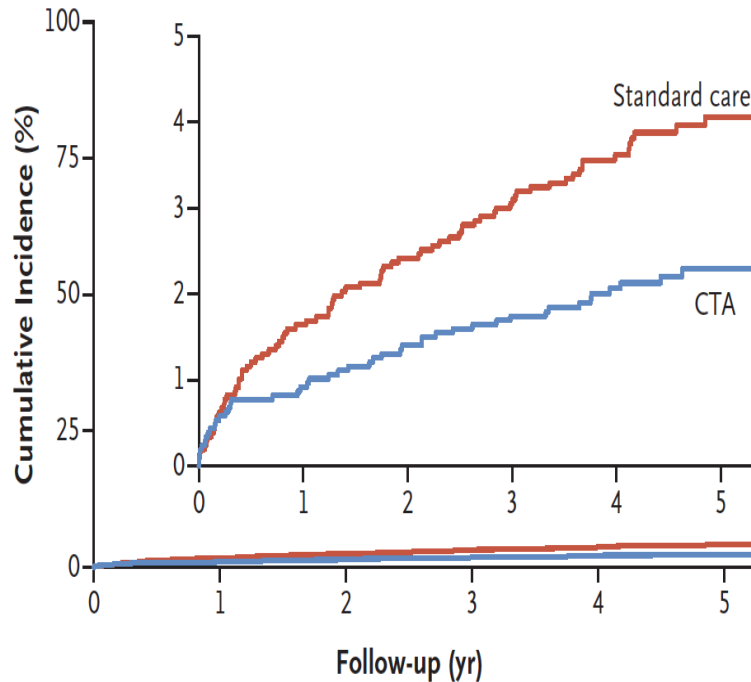


# MACE Free Survival Non-Obstructive Plaque and Statin Use (CONFIRM)

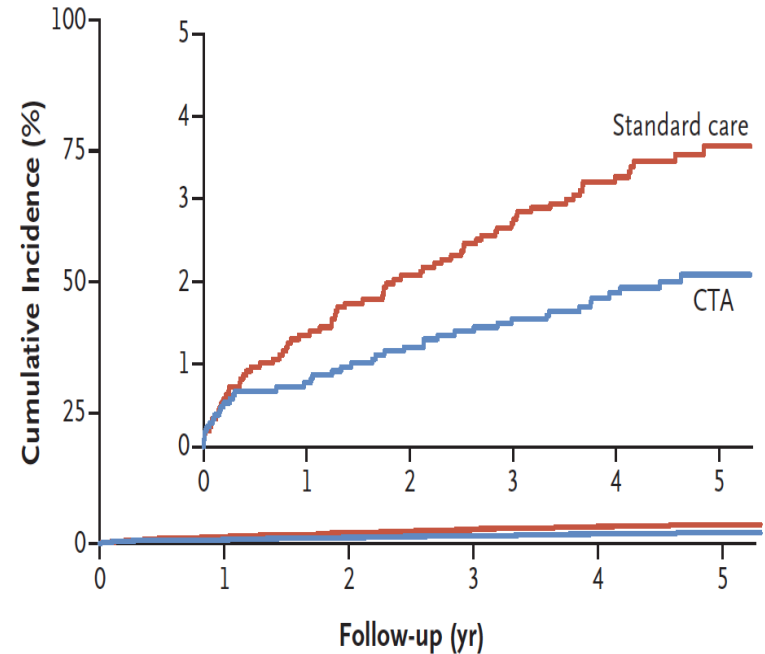


# SCOT-HEART Study Stable Chest Pain Open Label Randomization

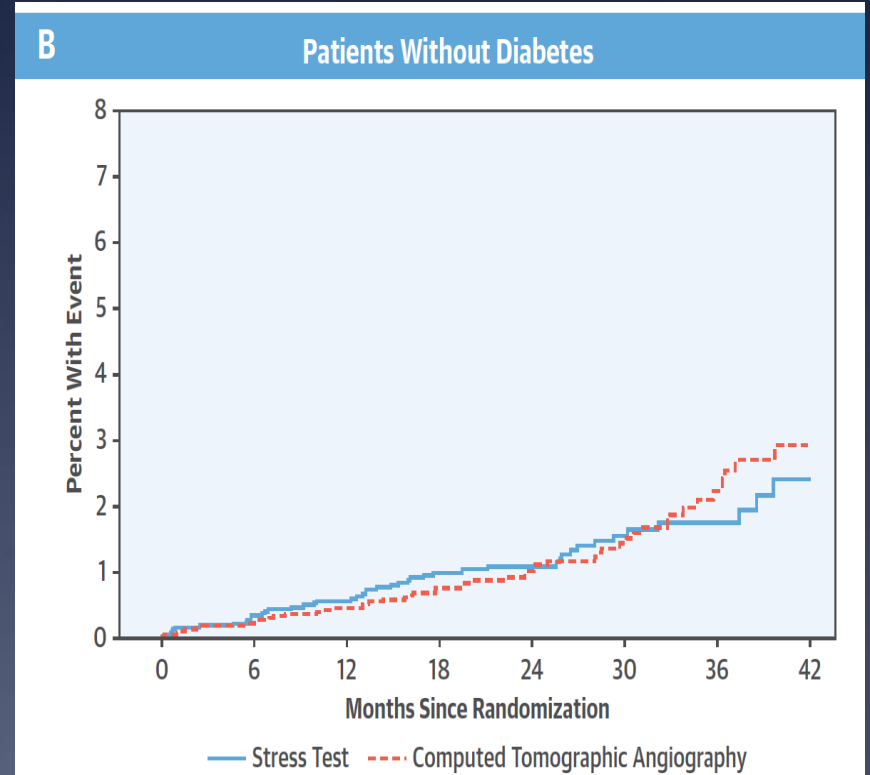
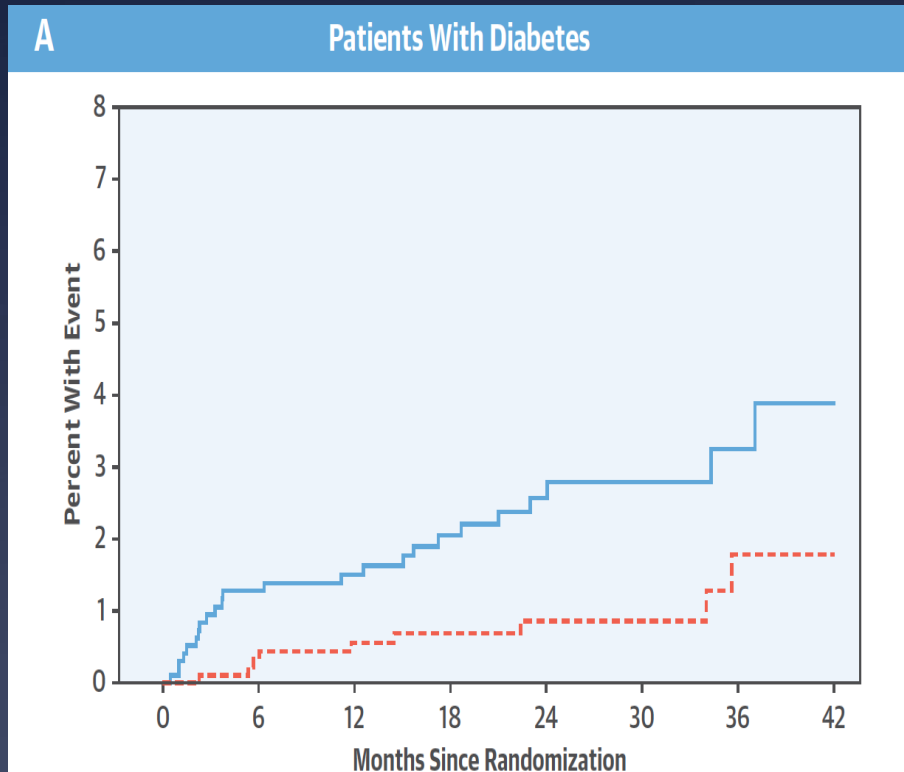
A Death from Coronary Heart Disease or Nonfatal Myocardial Infarction



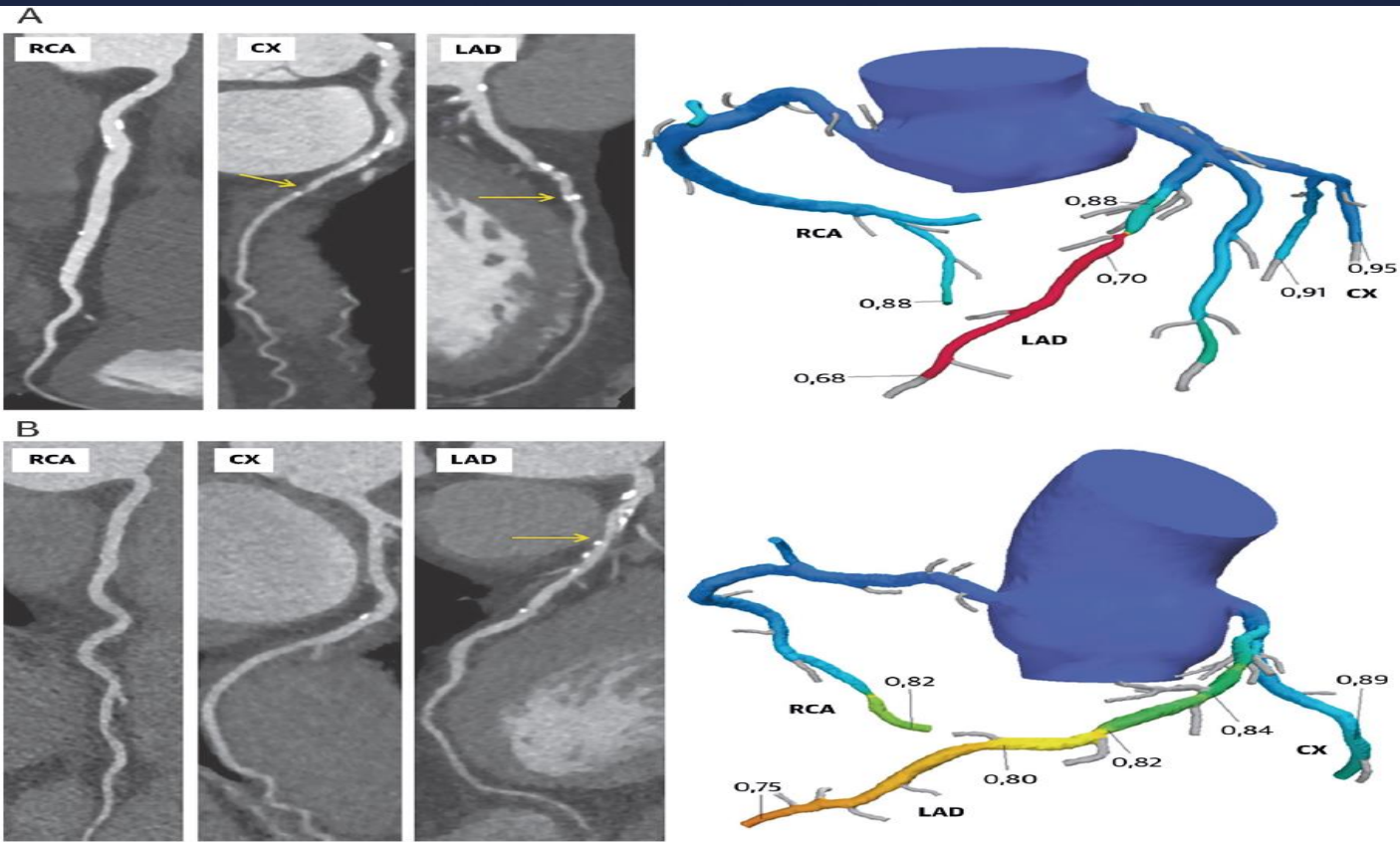
B Nonfatal Myocardial Infarction



# Stress Testing vs CTCA in Diabetics PROMISE Trial Composite of CV Death/MI In Stable Chest Pain



# CT-FFR In Practice



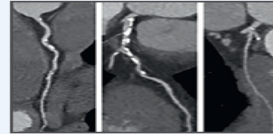
# Clinical Implications Of FFR-CT

**CENTRAL ILLUSTRATION** Diagnostic and Management Strategy With Clinical Outcomes in Patients Undergoing First-Line Coronary Computed Tomography Angiography With Selective FFR<sub>CT</sub> Testing

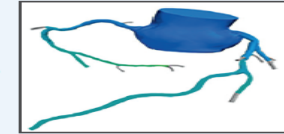
## I. Diagnostic Strategy

Clinical Presentation

+



+  
(CTA stenosis 30%-70%)



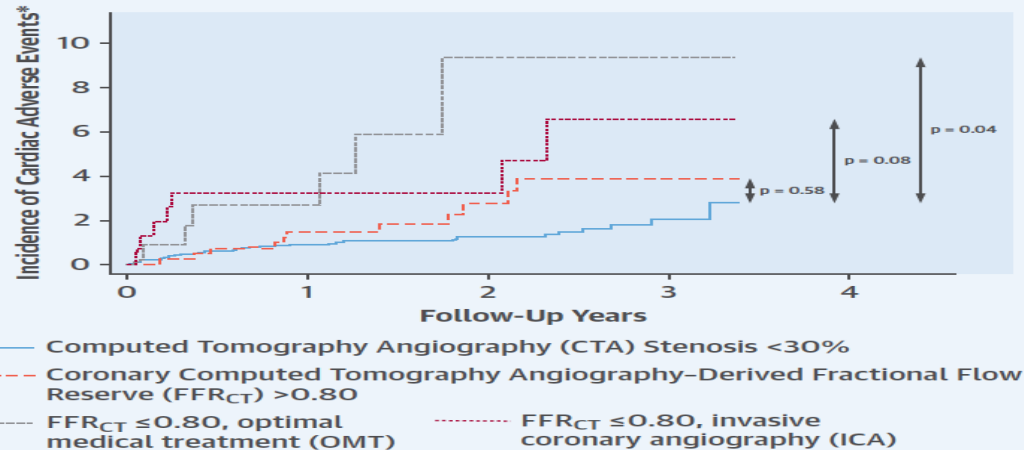
## II. Post-test Management

CTA stenosis <30%:  
No additional testing, OMT

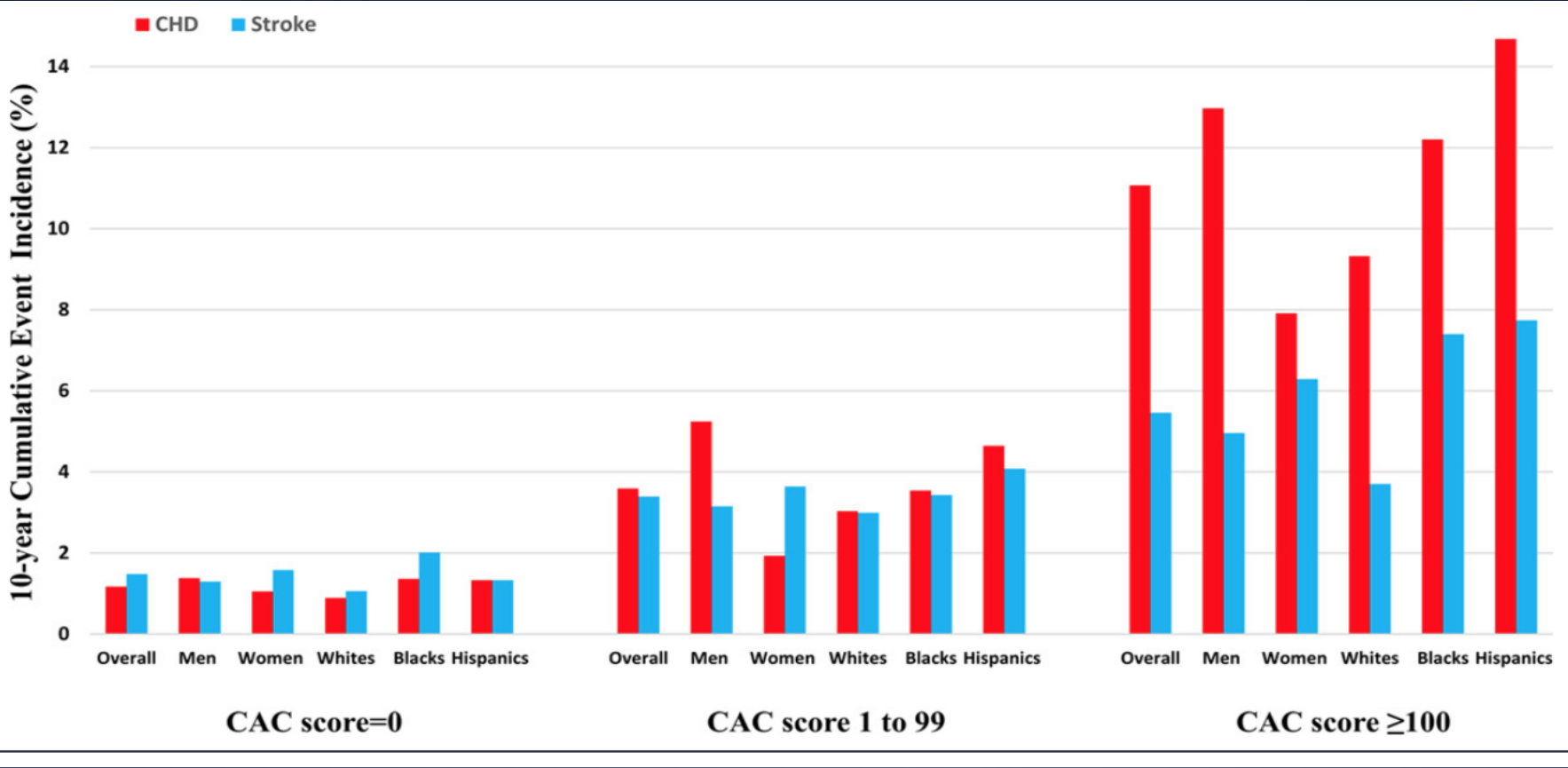
FFR<sub>CT</sub> >0.80:  
OMT

FFR<sub>CT</sub> ≤0.80:  
OMT, or OMT + ICA

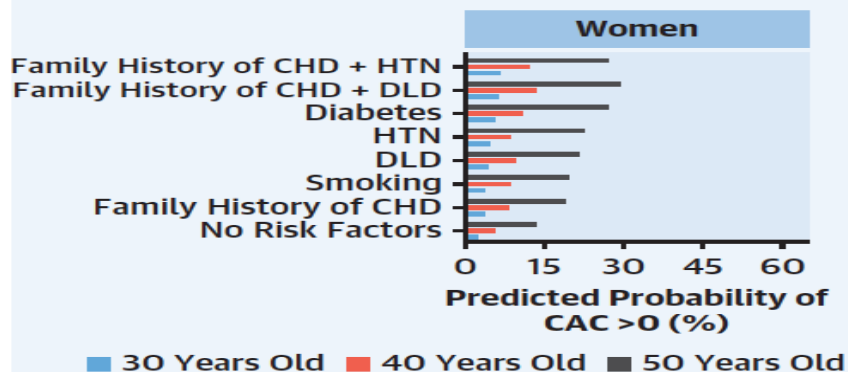
## III. Clinical Outcomes



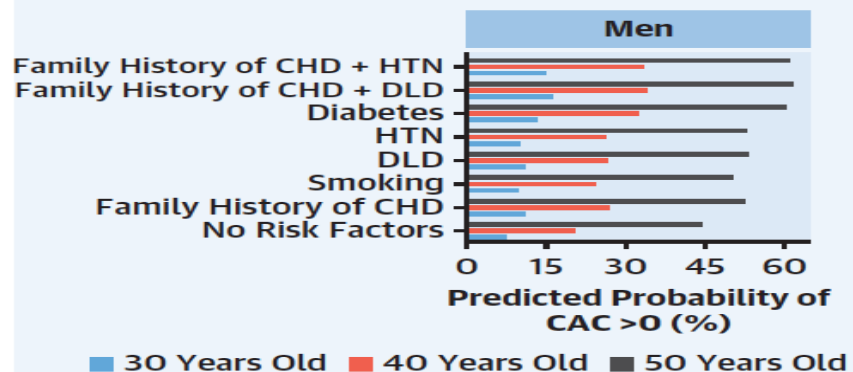
# Ten Year Incidence of CHD and Stroke by CAC



**Predicted Probability of CAC >0 in Women**



**Predicted Probability of CAC >0 in Men**



**Predicted Age of CAC >0 Conversion According to ASCVD Risk Factor Status**

Risk Factor	Women Age to CAC >0 Conversion (Years)*	Men Age to CAC >0 Conversion (Years)*	All Average Years Earlier to CAC >0*
None	58 (56-60)	42 (41-44)	Reference
Family History of CHD	53 (52-55)	39 (38-41)	-3.5
Current Cigarette Smoking	53 (51-55)	40 (39-42)	-3.5
Dyslipidemia	52 (51-54)	39 (38-41)	-4.5
Hypertension	53 (52-55)	39 (38-41)	-4
Diabetes	50 (49-52)	37 (36-38)	-6.5
Family History of CHD + Dyslipidemia	48 (46-50)	36 (35-38)	-8
Family History of CHD + Hypertension	49 (47-51)	36 (35-38)	-7.5

\*Using a 25% testing yield for CAC >0

# Compare CV Risk By CAC: Me and My Cousin Vinnie



The Multi-Ethnic Study of Atherosclerosis

## MESA 10-Year CHD Risk with Coronary Artery Calcification

[Back to CAC Tools](#)

1. Gender Male  Female
2. Age (45-85 years)  Years
3. Coronary Artery Calcification  Agatston
4. Race/Ethnicity **Choose One**
- Caucasian
- Chinese
- African American
- Hispanic
5. Diabetes Yes  No
6. Currently Smoke Yes  No
7. Family History of Heart Attack (History in parents, siblings, or children) Yes  No
8. Total Cholesterol  mg/dL or  mmol/L
9. HDL Cholesterol  mg/dL or  mmol/L
10. Systolic Blood Pressure  mmHg or  kPa
11. Lipid Lowering Medication Yes  No
12. Hypertension Medication Yes  No

Calculate 10-year CHD risk

The estimated 10-year risk of a CHD event for a person with this risk factor profile including coronary calcium is 2.9%. The estimated 10-year risk of a CHD event for a person with this risk factor profile if we did not factor in their coronary calcium score would be 9.1%.



The Multi-Ethnic Study of Atherosclerosis

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# Bottom Line

- \* Use the technology that best answers the question asked
- \* It's not the diagnostic test that prevents cardiovascular events, it's the action taken with as a result of the diagnostic test
- \* And if one does not plan on acting on the diagnostic test result, do not order the test

# DEBATE TEAM TOURNAMENT



"SCOTT, YOU'LL BE DISQUALIFIED THE NEXT TIME  
YOU SAY, 'WE'LL JUST HAVE TO AGREE TO DISAGREE.'"

