Coronary Artery Calcium Scoring

Matthew Nelson, MD, FACC, FASE

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The Problem

54 year old male with NSTEMI s/p PCI to the pLAD

BP 110/72 P 78

No smoking, diabetes, hypertension, high cholesterol

Hgb A1c 5.5

LDL 110 TC 170 HDL 48

HS-trop 563

The Problem:

ACC/AHA ASCVD risk score: 4.1%

Design

Patient Population

Real-World Data from Two Major Hospitals
Patients presenting with first Type 1 Myocardial Infarction between 2020–2025

N = 465

Age < 66 years

81% men
19% women

Question: Would current ASCVD risk scores and symptom-based screening have identified patients at risk if evaluated 48 hours before their first ACS event?

Findings

Statin Indication as per ACC/AHA 2018 Guideline

ASCVD Risk Estimator Plus

LDL > 190 mg/dl or Diabetes Mellitus	78 patients (17%)
ASCVD > 20%	47 patients (10%)
ASCVD 7.5 -20%	131 patients (28%)
ASCVD 5-7.5%	56 patients (12%)
ASCVD < 5%	153 patients (33%)

Statin or Imaging **NOT** recommended: **45%**

Prevent Calculator

LDL > 190 mg/dl or Diabetes Mellitus	59 patients (13%)
ASCVD > 20%	14 patients (3%)
ASCVD 7.5 -20%	107 patients (23%)
ASCVD 5-7.5%	75 patients (16%)
ASCVD < 5%	210 patients (45%)

Statin or Imaging **NOT** recommended: **61%**

Timing of First Ever Symptom of Chest Pain or Dyspnea Prior to Event

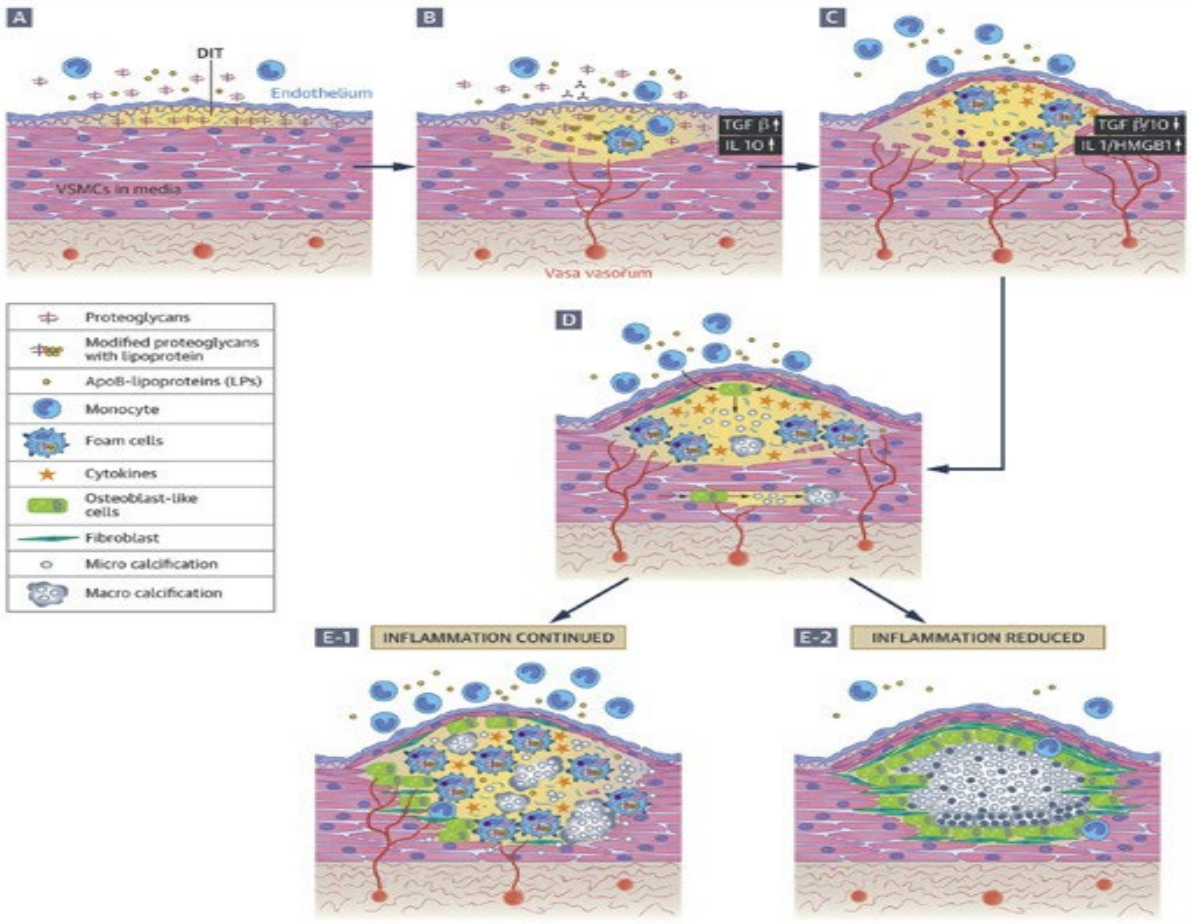
> 3 months	31 patients (7%)
1 - 3 months	12 patients (3%)
1 week - 1 month	34 patients (7%)
2 - 7 days	108 patients (23%)
≤ 48 hours	33 patients (7%)
Same Day	247 patients (53%)

First Presentation within 48hr or less of the ASC Event: **60%**

Brief Report, JACC: Advances Volume 4, Number 12_Part_2

Coronary Plaque

CENTRAL ILLUSTRATION: The Evolution of Atheroma and Calcification: Plaque Initiation, Inflammation, Microcalcification and Progression to Macrocalcification



Nakahara, T. et al. J Am Coll Cardiol Img. 2017;10(5):582–93.

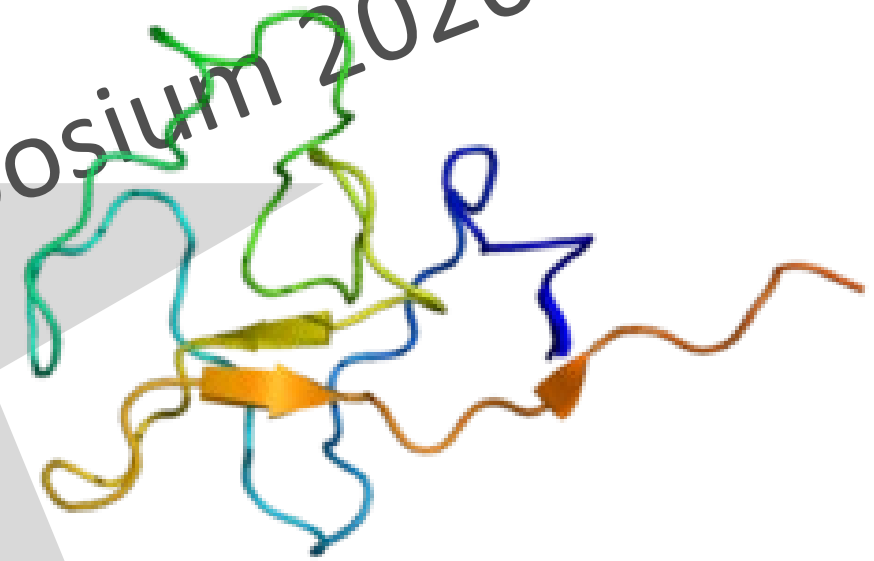
2026

Apolipoprotein B

ApoB-48 (Usually negligible)
-Chylomicrons

ApoB-100 (Atherogenic Particles)
-VLDL
-Intermediate Density LDL
-LDL
-Lipoprotein (a)

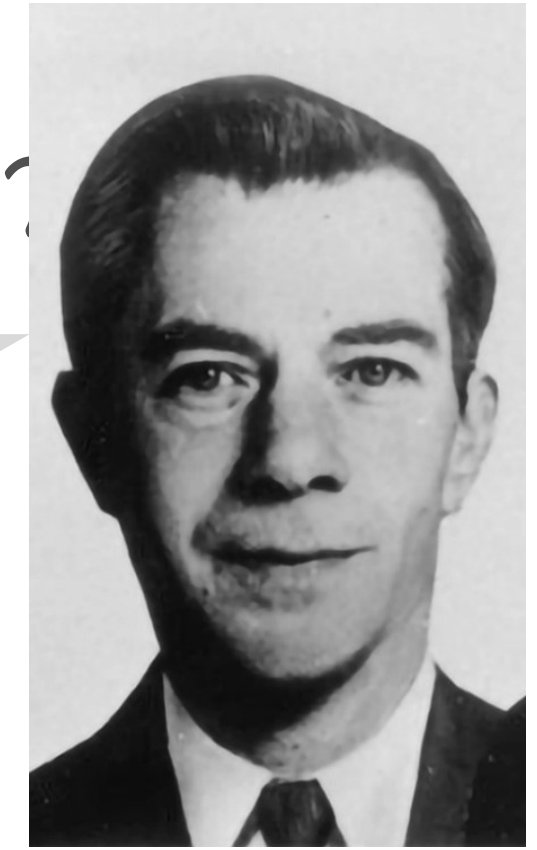
Measuring ApoB particles
-FLP (85-95%)
-Non HDL (TC – HDL-C (95-100%)
-Direct ApoB (100%)



Suttons Law

Willie Sutton

Asked why he robbed banks: "Because that's where the money is."



Some History…

JACC Vol. 15, No. 4
March 15, 1990:827–32

Quantification of Coronary Artery Calcium Using Ultrafast Computed Tomography

ARTHUR S. AGATSTON, MD, FACC, WARREN R. JANOWITZ, MD,
FRANK J. HILDNER, MD, FACC, NOEL R. ZUSMER, MD, MANUEL VIAMONTE, JR., MD,
ROBERT DETRANO, MD, PHD
Miami Beach, Florida and Long Beach, California

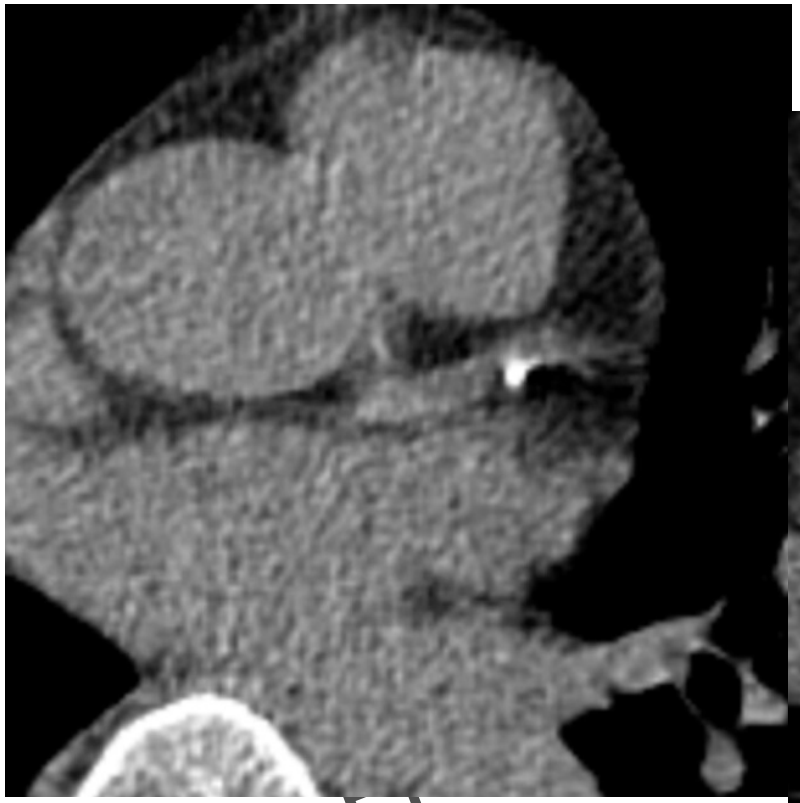
Ultrafast computed tomography was used to detect and quantify coronary artery calcium levels in 584 subjects (mean age 48 ± 10 years) with (n = 109) and without (n = 475) clinical coronary artery disease. Fifty patients who underwent fluoroscopy and ultrafast computed tomography were also evaluated. Twenty contiguous 3 mm slices were obtained of the proximal coronary arteries. Total calcium scores were calculated based on the number, areas and peak Hounsfield computed tomographic numbers of the calcific lesions detected.

In 88 subjects scored by two readers independently, interobserver agreement was excellent with identical total scores obtained in 70. Ultrafast computed tomography was more sensitive than fluoroscopy, detecting coronary calcium in 90% versus 52% of patients. There were significant differences ($p < 0.0001$) in mean total calcium scores for those with versus those without clinical coronary artery disease by decade: 5 versus 132, age 30 to 39 years; 27 versus 291, age 40 to 49 years; 83 versus 462, age 50 to 59 years; and 187 versus 786, age 60 to 69 years.

Sensitivity, specificity and predictive values for clinical coronary artery disease were calculated for several total calcium scores in each decade. For age groups 40 to 49 and 50 to 59 years, a total score of 50 resulted in a sensitivity of 71% and 74% and a specificity of 91% and 70%, respectively. For age group 60 to 69 years, a total score of 300 gave a sensitivity of 74% and a specificity of 81%. The negative predictive value of a 0 score was 98%, 94% and 100% for age groups 40 to 49, 50 to 59 and 60 to 69 years, respectively. Ultrafast computed tomography is an excellent tool for detecting and quantifying coronary artery calcium.

(J Am Coll Cardiol 1990;15:827–32)

Coronary calcium scoring



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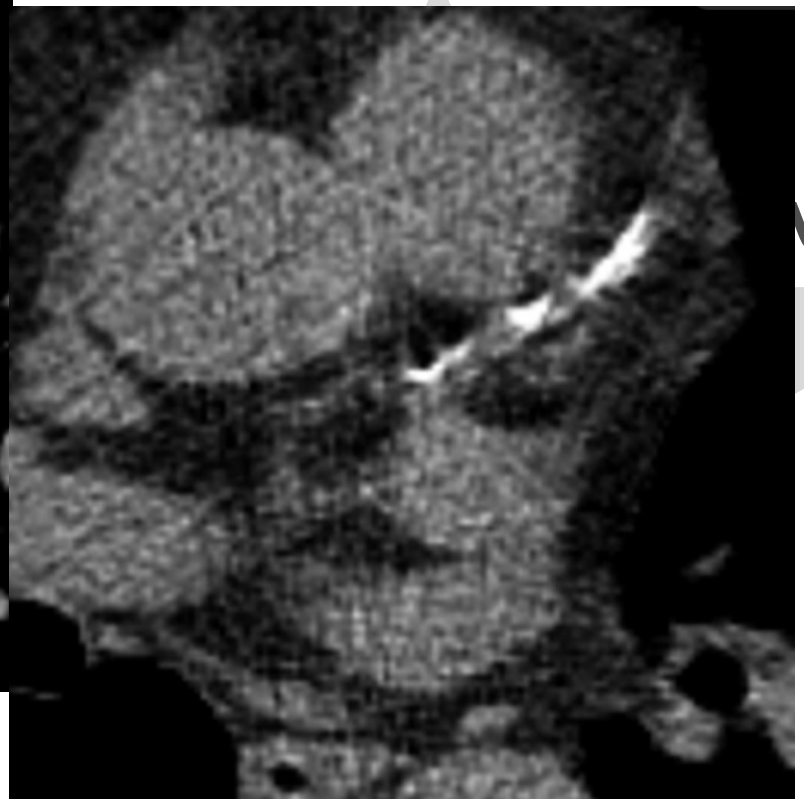
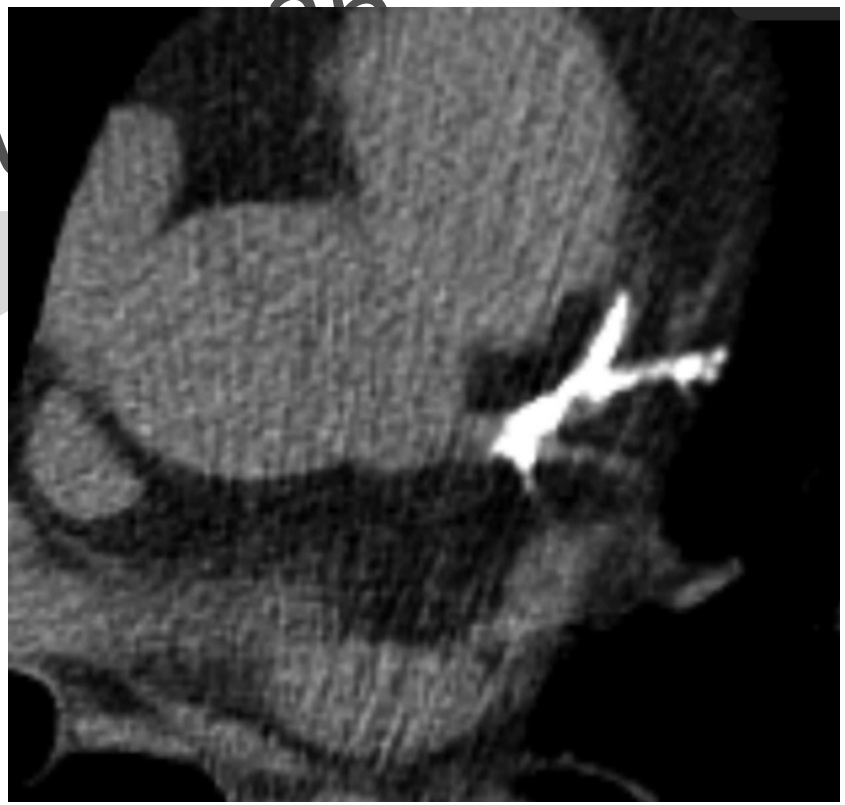


100-399



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Calcium Score tells you Risk NOT osium

MESA Study

Does coronary artery calcium predict coronary events independent of traditional risk factors?

6,722 men and women

-Mixed population: white, black, Hispanic, and Chinese

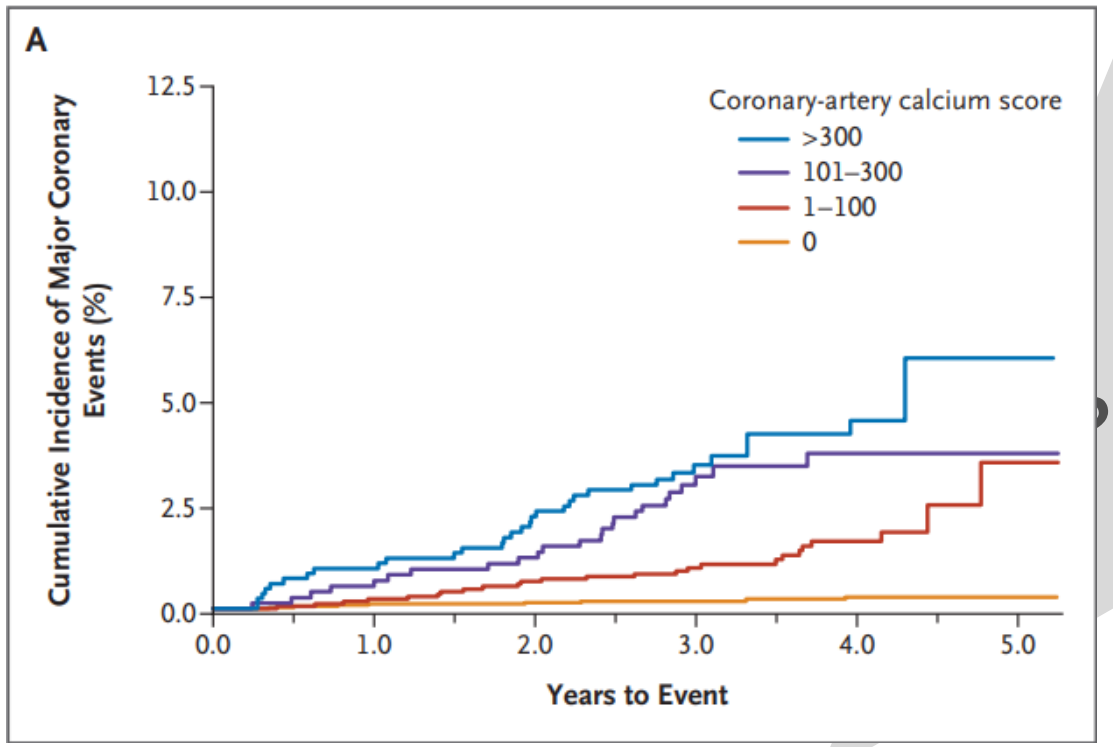
-3.8 years

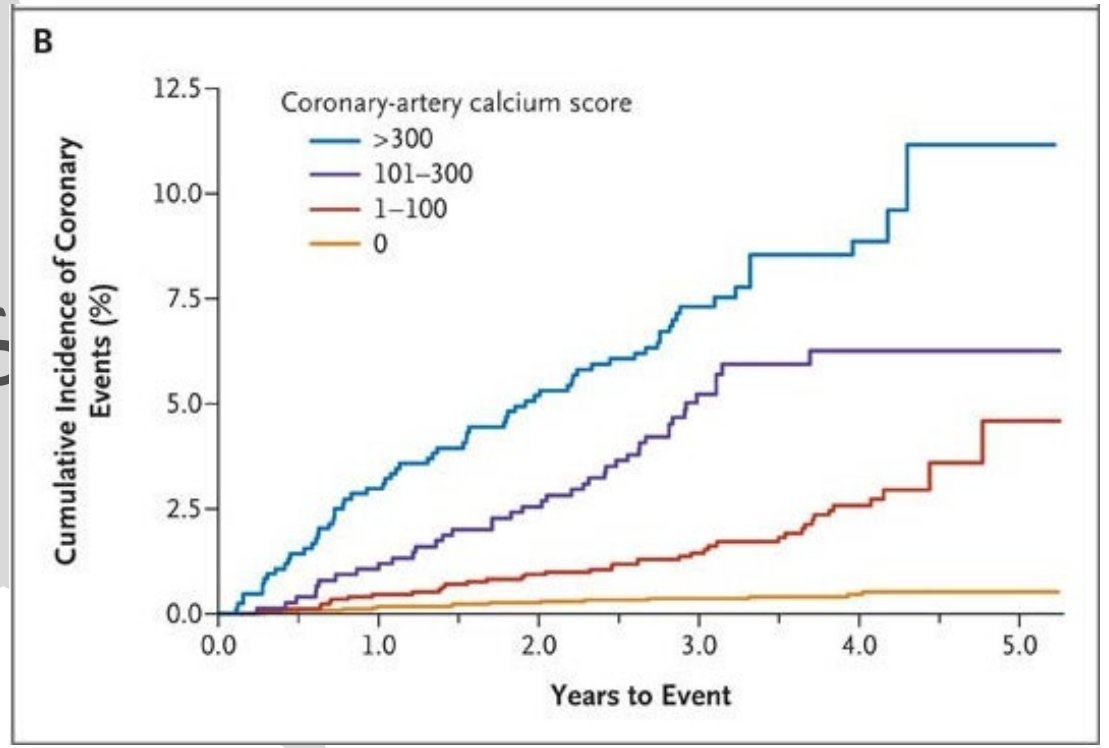
-Major events: CAD death, MI

-All Coronary events: Angina +/-Revascularization + Major outcomes

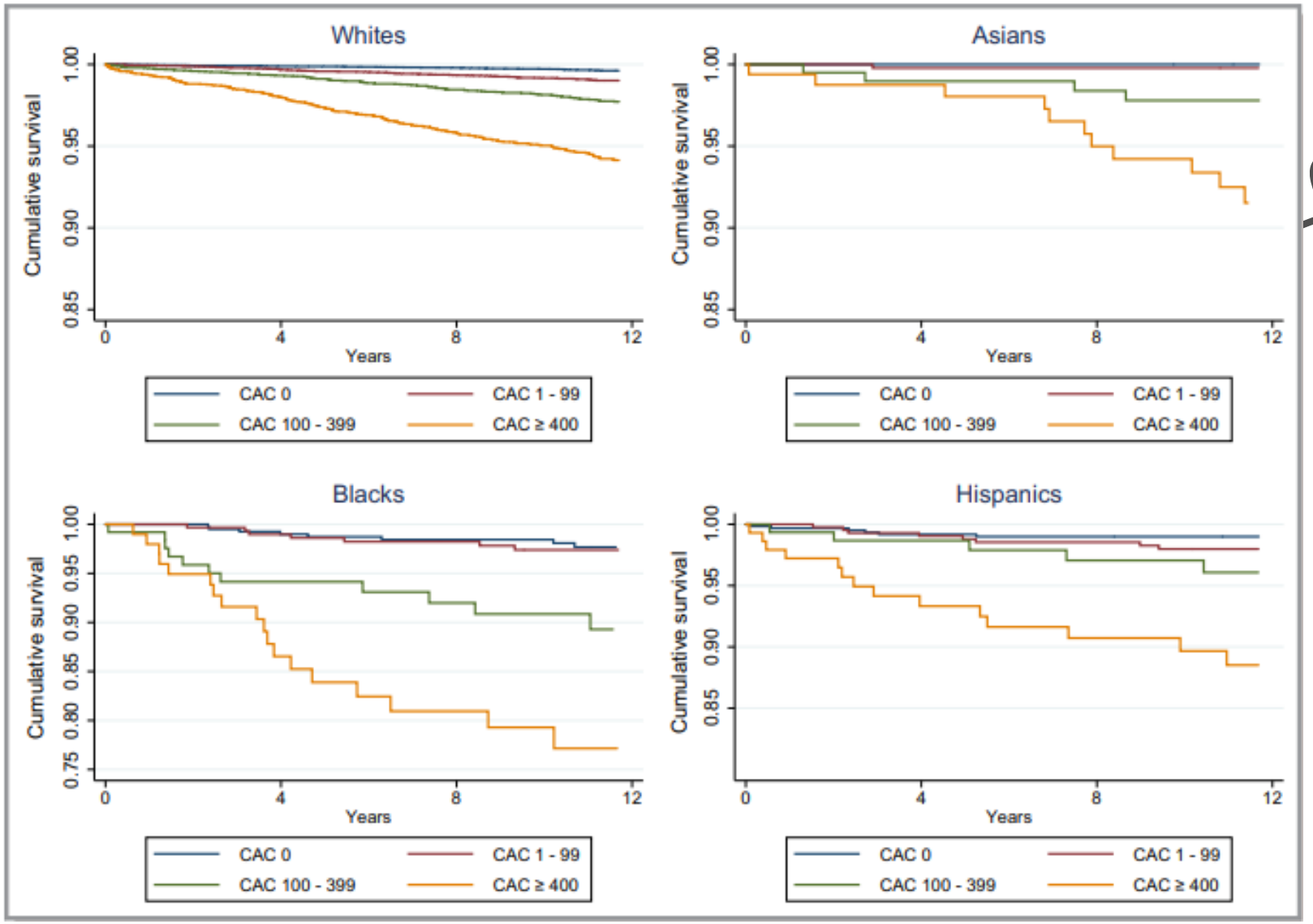
N Engl J Med 2008;358:1336-45.

MESA RESULTS





Cardiovascular mortality by ethnicity



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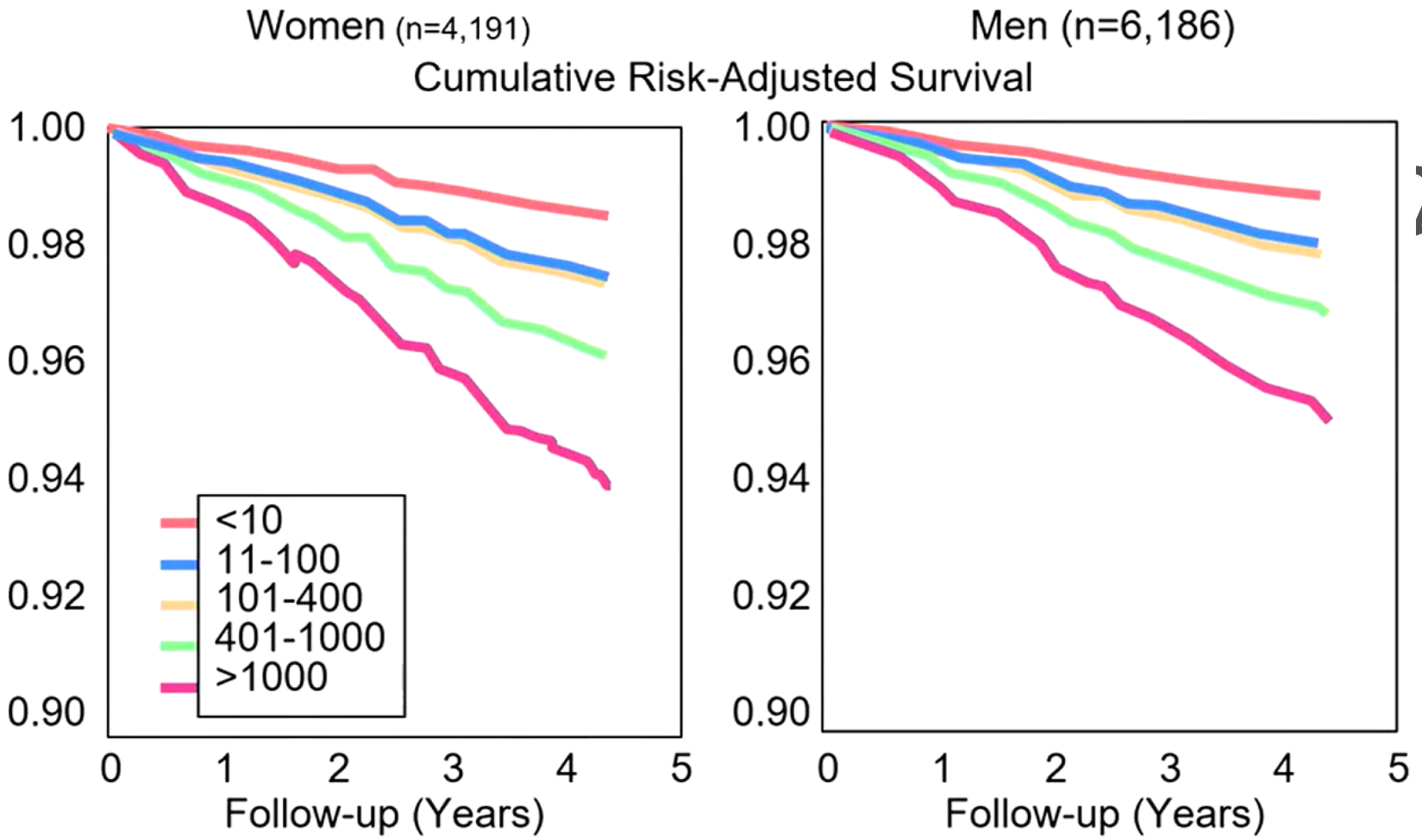
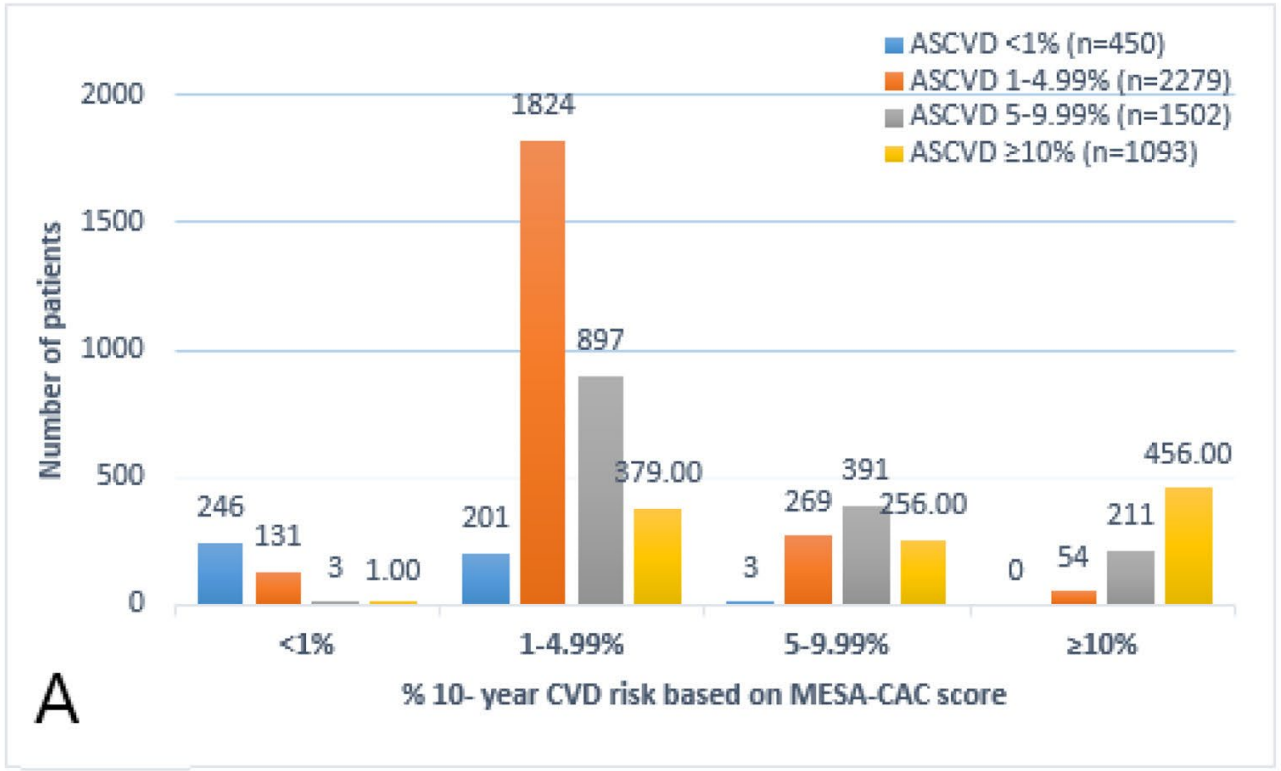
Prognosis by gender

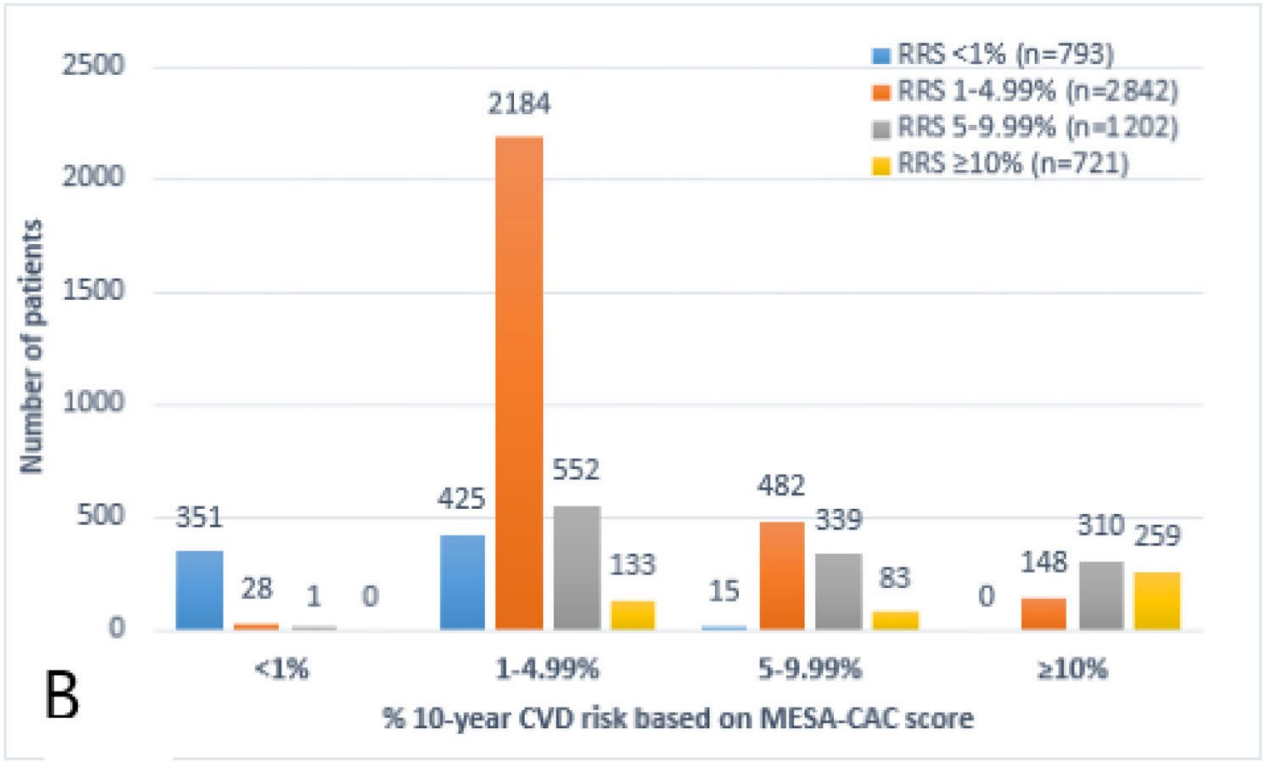


2026

Raggi P, J Women Health. 2004

Reclassification





31.3% Upgrade in Risk

13.9% Downgrade in Risk

Ali et al, AJC 2023 (206): 303

Advantages of Calcium Scoring

Low Cost

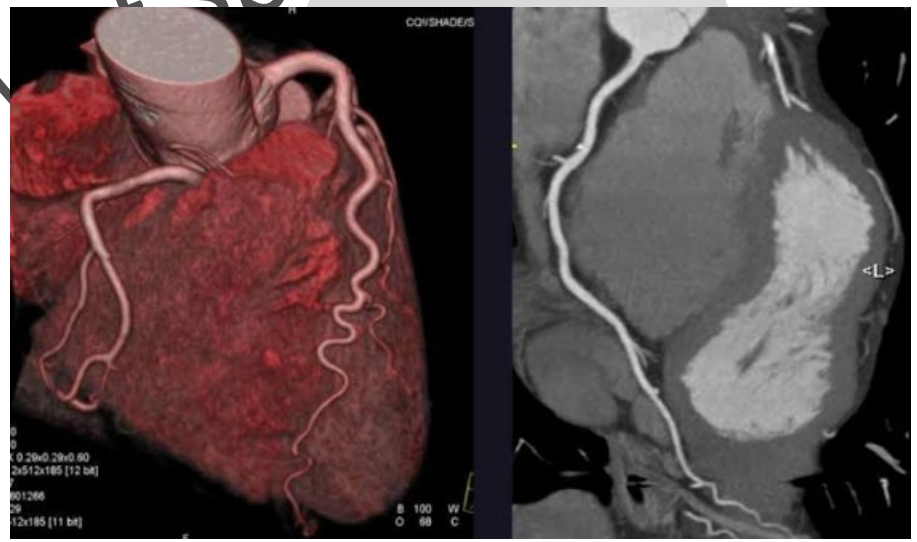
Low Radiation

High Reproducibility

Widely Available

Data since 1990

CT Coronary angiography/FFR not approved for asymptomatic individuals



The Power of Zero

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The Power of Zero

45 year old female

- -Asymptomatic
- -Nonsmoker
- -BP 110/60, P 70
- -Weight 126 pounds
- -No medications
- -Father MI at 54 (smoker/stress job)
- -High cholesterol in family
- -LDL 168mg/dl

10 year risk of CHD event: 1.0%

Should I take medications

1. Gender	Male ○	Female ◉				
2. Age (45-85 years)	45	Years				
3. Coronary Artery Calcification	0	Agatston				
4. Race/Ethnicity	Caucasian					
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	240	mg/dL	or	6.2	mmol/L	
9. HDL Cholesterol	80	mg/dL	or	2.1	mmol/L	
10. Systolic Blood Pressure	110	mmHg	or	14.7	kPa	
11. Lipid Lowering Medication	Yes ○	No ◉				
12. Hypertension Medication	Yes ○	No ◉				

Calculate 10-year CHD risk

Using the Coronary Artery Calcium Score

10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
0.8%	38	-7

Without Considering the Coronary Artery Calcium Score

10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
0.9%	38	-7

026

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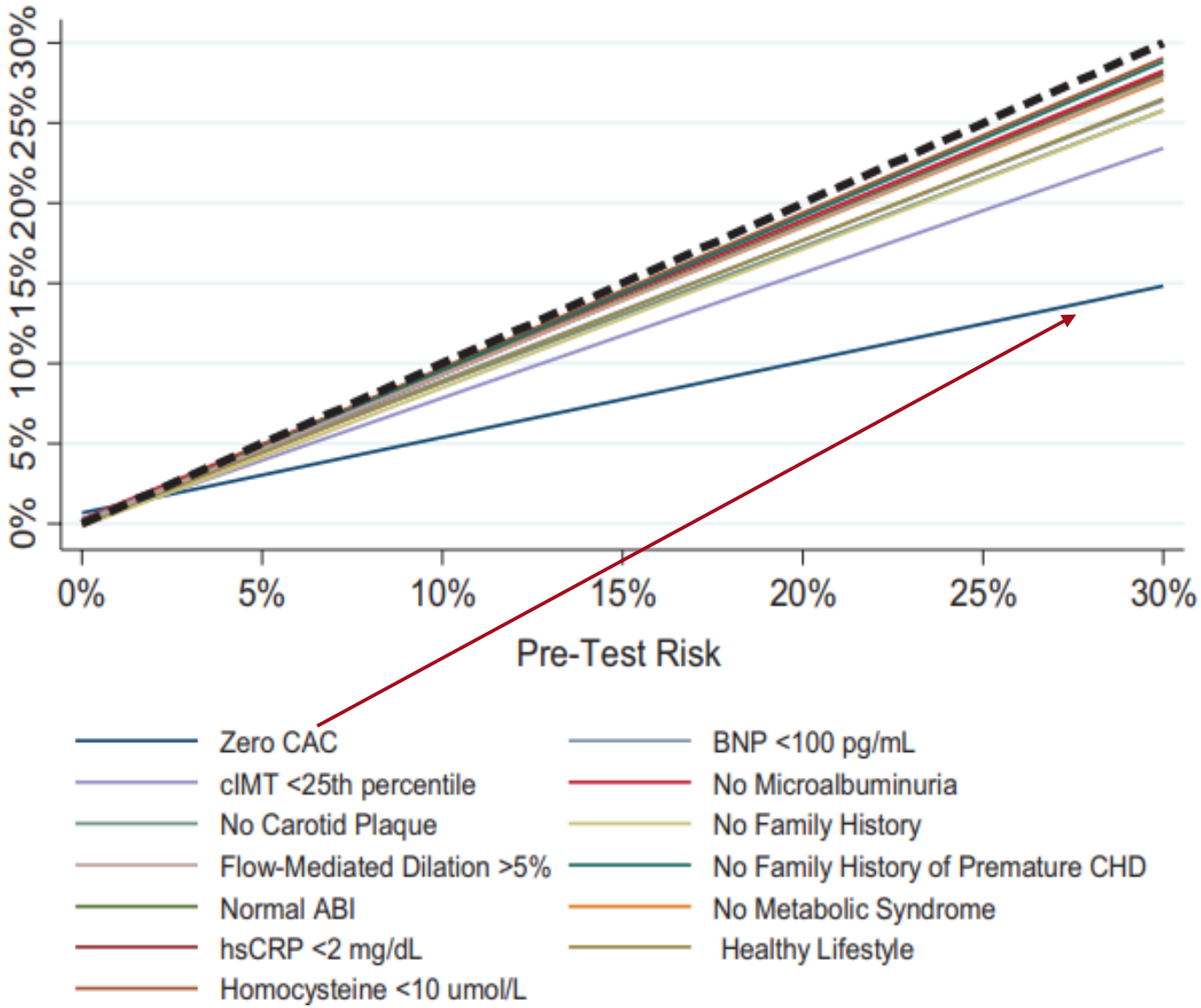
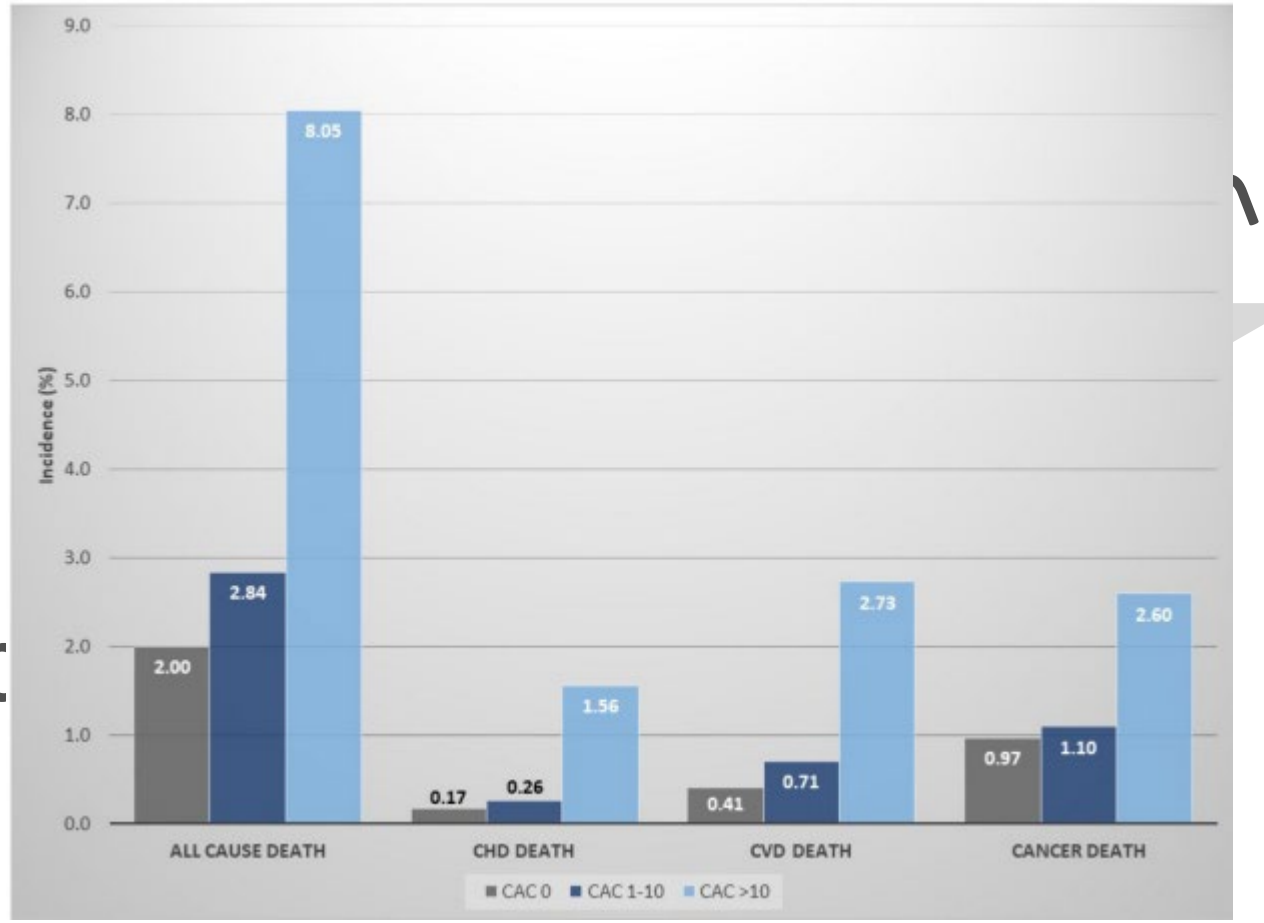
CAC score of zero



Circulation. 2016;133:849-858.

Score of 0

CAC Consortium



Follow Up of CAC

CAC 0

Low Risk (5-7 years)

Intermediate risk (3-5 years)

Diabetes (3 years)

CAC >100

No need to repeat

CAC 1-99

3-5 years (???) if not on a statin

No need to check serial CAC on statin therapy

-Statins may accelerate coronary artery calcification**

JACC Cardiovasc Imaging. 2021;14(5):990

**JACC Cardiovasc Imaging. 2018;11(10):1475

100 or more

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100 or more

59 year old male

-Asymptomatic

-Nonsmoker

-BP 135/80, P 70

-Weight 210 pounds

-No medications

-LDL 168mg/dl

10 year risk of CHD event 16.1%

MESA 10-Year CHD Risk with Coronary Artery Calcification

1. Gender	Male ◉	Female ○			
2. Age (45-85 years)	59	Years			
3. Coronary Artery Calcification	110	Agatston			
4. Race/Ethnicity	Caucasian				
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	235	mg/dL	or	6.1	mmol/L
9. HDL Cholesterol	50	mg/dL	or	1.3	mmol/L
10. Systolic Blood Pressure	135	mmHg	or	18.0	kPa
11. Lipid Lowering Medication	Yes ○	No ◉			
12. Hypertension Medication	Yes ○	No ◉			

Calculate 10-year CHD risk

Using the Coronary Artery Calcium Score

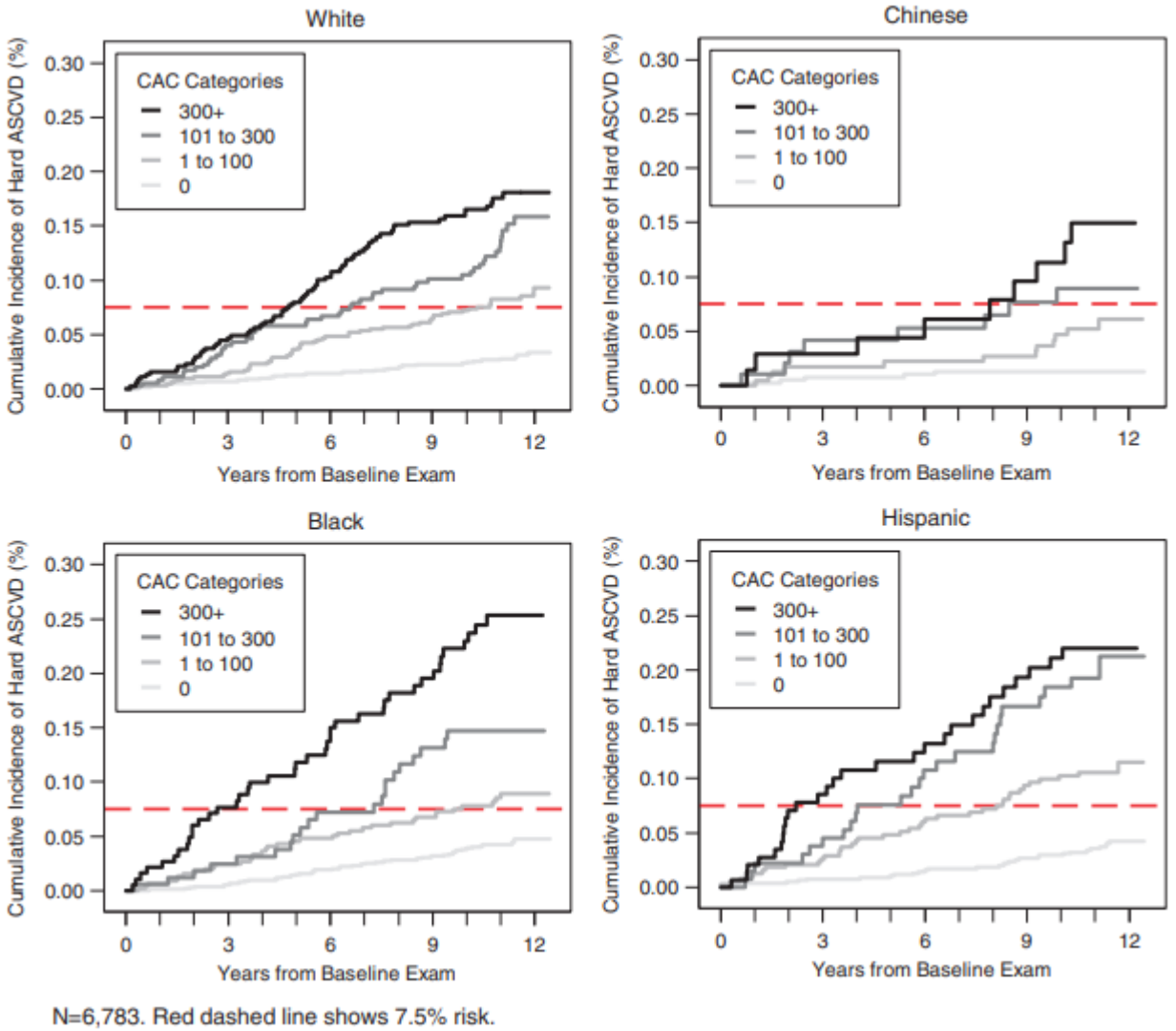
10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
9.1%	68	+9

Without Considering the Coronary Artery Calcium Score

10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
6.1%	59	+0

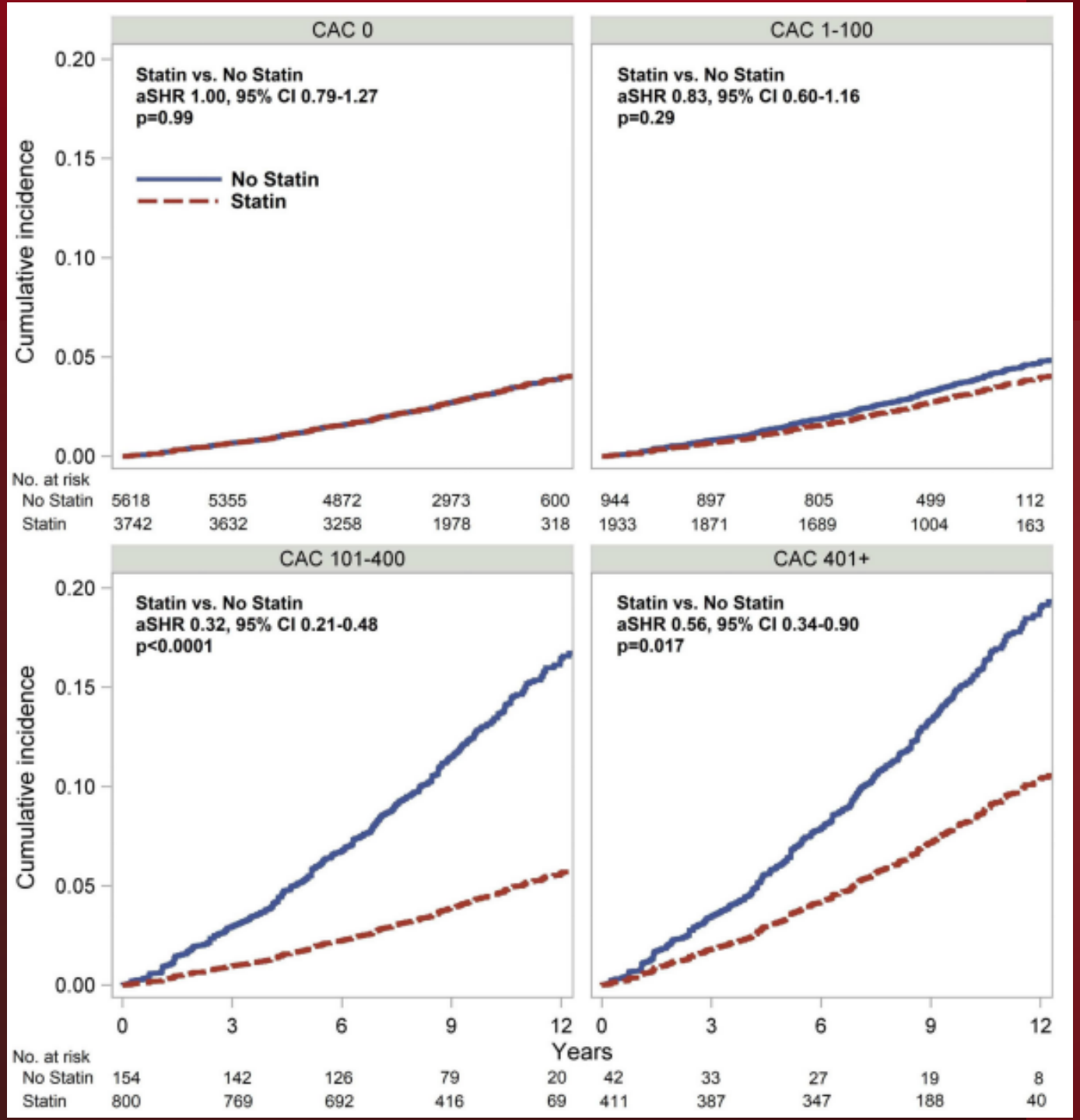
n 2026

CAC >100



N=6,783. Red dashed line shows 7.5% risk.

European Heart Journal (2018) 39, 2401–2408


CAC 0
Statin vs. No Statin
aSHR 1.00, 95% CI 0.79-1.27
p=0.99
No Statin
Statin
CAC 1-100
Statin vs. No Statin
aSHR 0.83, 95% CI 0.60-1.16
p=0.29
CAC 101-400
Statin vs. No Statin
aSHR 0.32, 95% CI 0.21-0.48
p<0.0001
CAC 401+
Statin vs. No Statin
aSHR 0.56, 95% CI 0.34-0.90
p=0.017
Cumulative incidence
0.00
0.05
0.10
0.15
0.20
No. at risk
No Statin 5618 5355 4872 2973 600 944 897 805 499 112
Statin 3742 3632 3258 1978 318 1933 1871 1689 1004 163
No. at risk
No Statin 154 142 126 79 20 42 33 27 19 8
Statin 800 769 692 416 69 411 387 347 188 40
0 3 6 9 12
Years

75th percentile

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75th percentile

48 year old female

-Asymptomatic

-Nonsmoker

-BP 110/60, P 60

-Weight 233 pounds

-Strong family history

-No medications

-LDL 154mg/dl

-Ten year ASCVD risk: <5%

-Calcium score 72 (98th percentile)

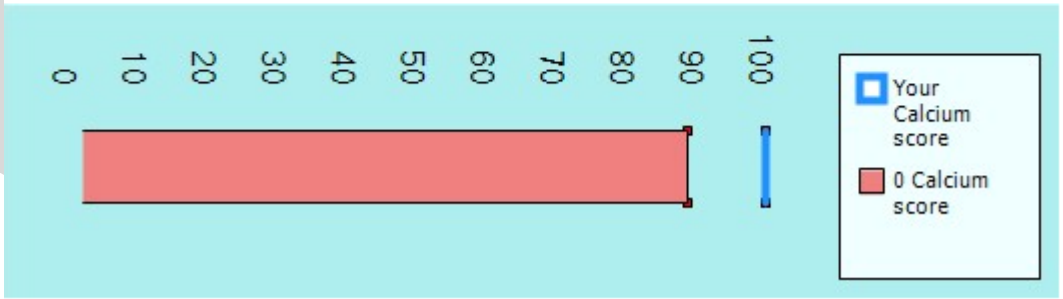
Percentiles and Calcium Scores for: white female of age 48

25th	50th	75th	90th
0	0	0	3

The observed calcium score of 72 is at percentile 98

for subjects of the same age, gender, and race/ethnicity who are free of clinical cardiovascular disease and treated diabetes.

Chart 1: Percentiles



15 years: 9% vs. 5% event rate

JAHA 2020 Dec 22;10(1):e018342

>400

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I don’t wanna!

66 year old male

-Asymptomatic

-Nonsmoker

-BP 133/81, P 80

-Weight 233 pounds

-No medications

-LDL 160mg/dl

-Ten year ASCVD risk: 10.9%

-Does not want to take medications

1. Gender	Male ◉	Female ○				
2. Age (45-85 years)	66	Years				
3. Coronary Artery Calcification	0	Agatston				
4. Race/Ethnicity	Caucasian					
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	248	mg/dL	or	6.4	mmol/L	
9. HDL Cholesterol	33	mg/dL	or	0.9	mmol/L	
10. Systolic Blood Pressure	133	mmHg	or	17.7	kPa	
11. Lipid Lowering Medication	Yes ○	No ◉				
12. Hypertension Medication	Yes ○	No ◉				

Calculate 10-year CHD risk

Using the Coronary Artery Calcium Score

10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
3.7%	47	-19

Without Considering the Coronary Artery Calcium Score

10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
10.9%	72	+6

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1. Gender	Male ◉	Female ○			
2. Age (45-85 years)	66	Years			
3. Coronary Artery Calcification	1912	Agatston			
4. Race/Ethnicity	Caucasian				
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	248	mg/dL	or	6.4	mmol/L
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Calculate 10-year CHD risk

Using the Coronary Artery Calcium Score

10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
25.8%	93	+27

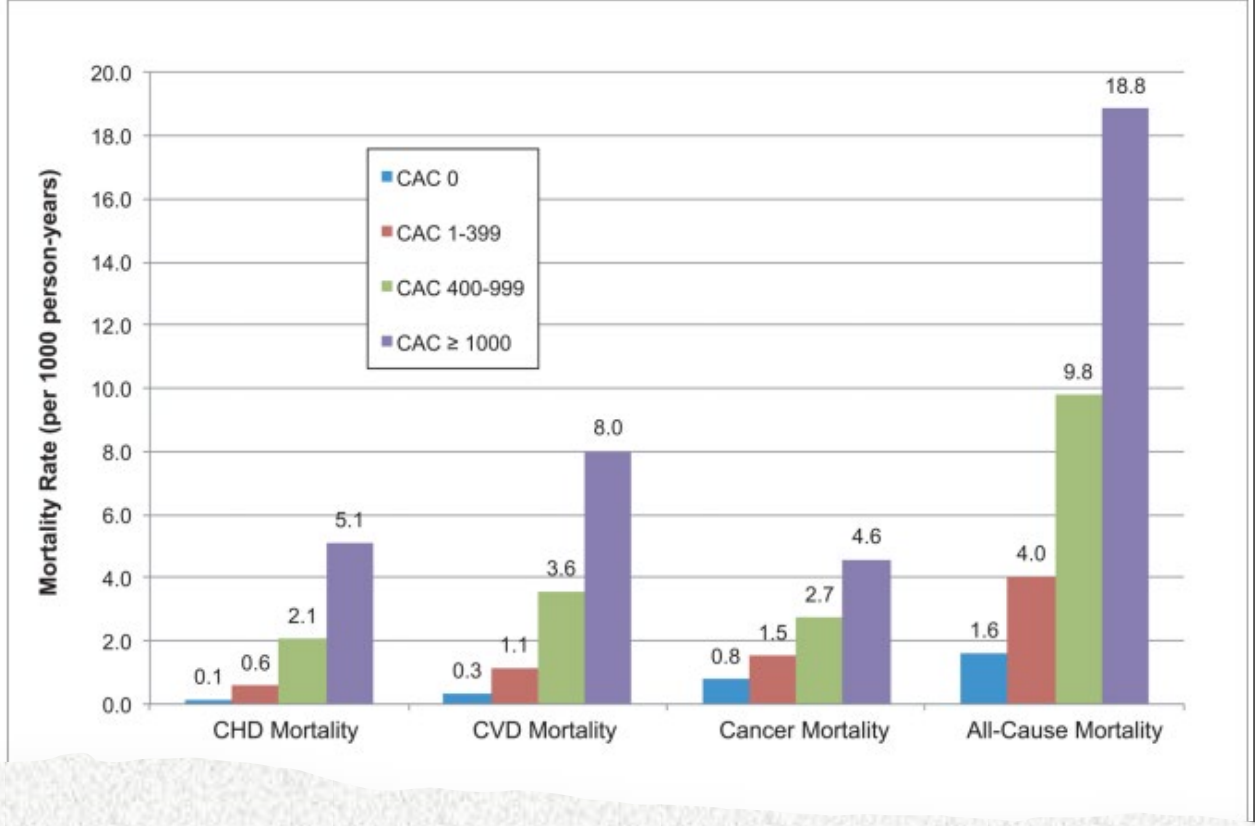
Without Considering the Coronary Artery Calcium Score

10 Year risk of a CHD Event	Coronary Age	Difference from Chronologic Age
10.9%	72	+6

CAC >400 = Stress Testing

To examine the frequency of ischemia according to CAC scores, we first evaluated the 6 literature studies (3,6,17,25,28,30) that permitted assessment according to the conventional grouping of CAC scores of 0, 1 to 99, 100 to 399, and ≥400. Among these studies, we observed a stepwise increase in the frequency of myocardial ischemia according to CAC abnormality. Among those with no CAC score, the average of frequency of inducible ischemia was 6.6% and among those with CAC scores ≥400, the average frequency of inducible ischemia was 23.6%. A wide range of individual frequencies were observed, however, with the frequency of ischemia ranging from 0 to 24.1% among patients with a CAC score of zero, and ranging from 12.4% to 57.1% among those with a CAC score ≥400.

JACC: CV Imaging, V O L . 9 , N O . 5 , 2 0 1 6 Bavishi et al.M A Y 2 0 1 6 : 5 8 0 – 9



CAC score of >1,000

JACC CV Imaging. 2020 January;13(1 Pt 1):83-93

Mild, moderate, severe

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“Nobody told me that!”

56 year old female

-Palpitations

-Nonsmoker

-Father with bypass in his 50s

-BP 117/71, P 62

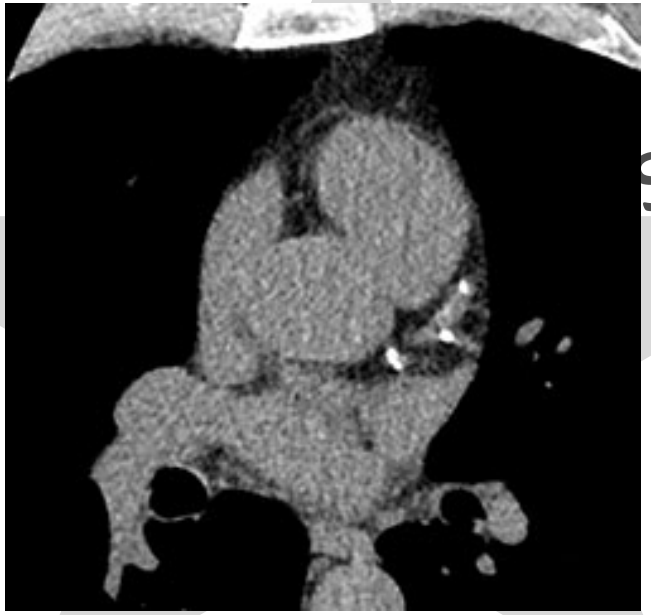
-Weight 150 pounds

-No medications

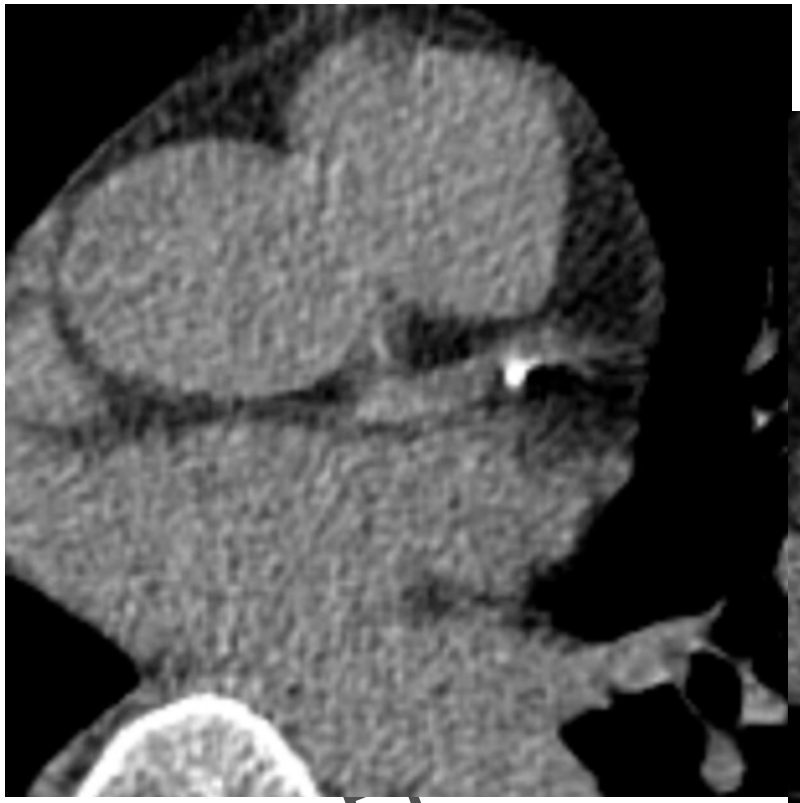
-LDL 112mg/dl

-10 year ASCVD Risk (2.6%)

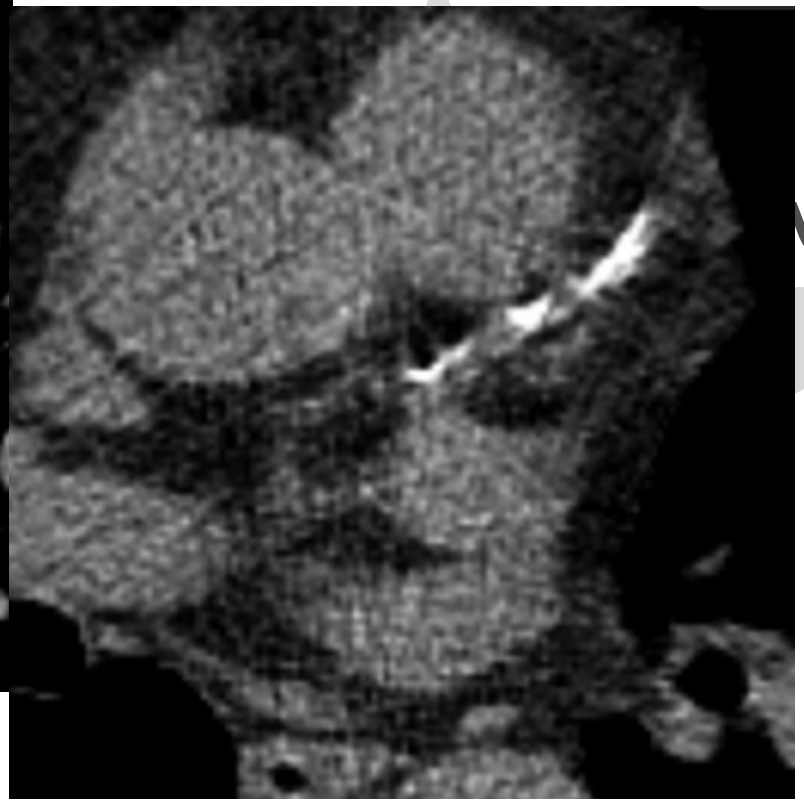
CT in ER for episode of CP



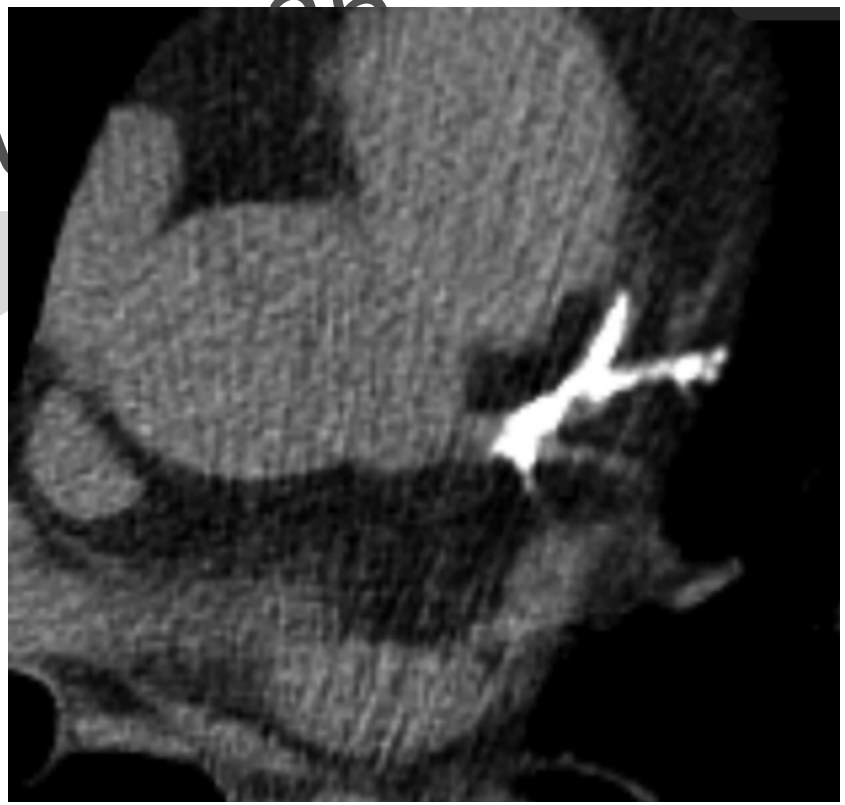
Incidental CAC



Mild

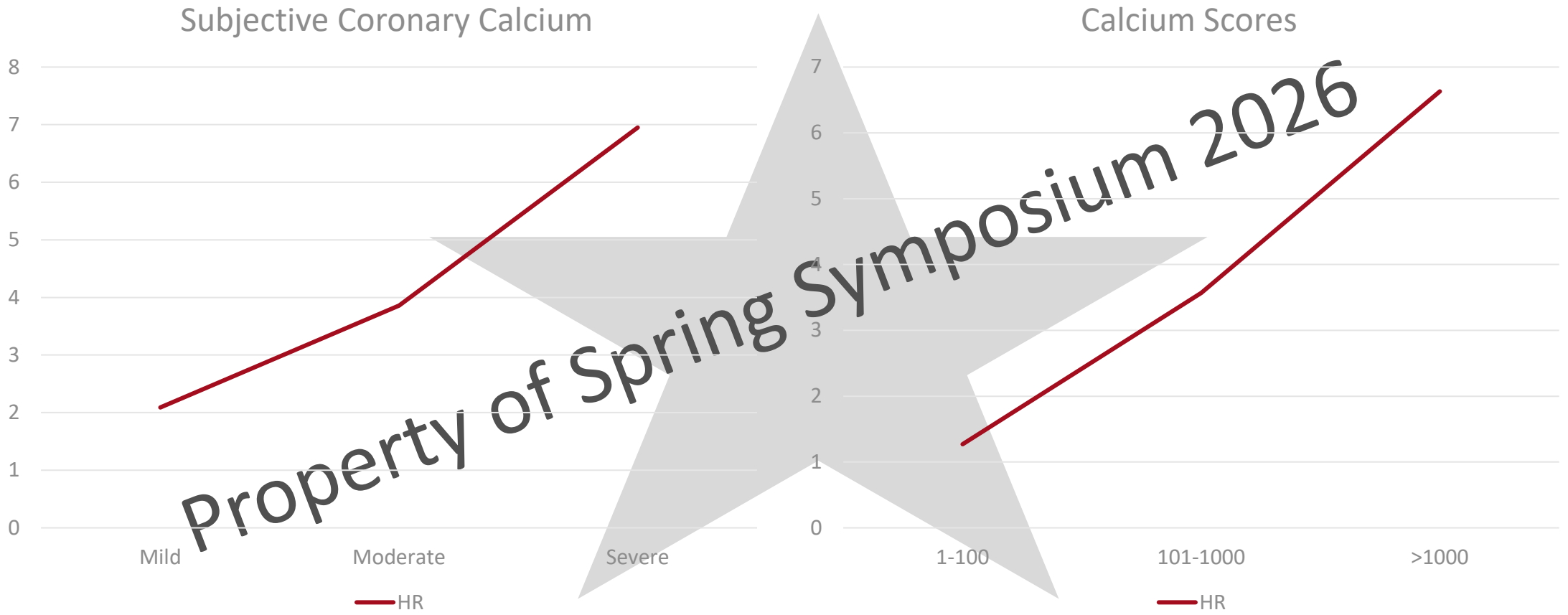


Moderate



Severe

Incidental CAC and Heart Death



Radiology, 2015 Jul;276(1):82-90

Conclusion – Subjective CAC

6.2.3. Visual estimation

The NLST data were also analyzed by visual estimation of the entire coronary tree.[68] Categories of CAC on visual estimation are none, mild, moderate and severe. Compared to no CAC, the adjusted HR for coronary heart disease deaths were 2.09 (95% CI:1.3–4.16), 3.86 (95% CI: 2.02, 8.20) and 6.95 (95% CI: 3.73, 15.67) for mild, moderate and heavy calcification, respectively. Good agreement was noted between the visual assessment and Agatston score categories (weighted k = 0.75); exact agreement was noted in 73% and to within one category in 99.7%. Interreader category agreements were comparable as well: weighted k of 0.85 for visual assessment and correlation coefficient of 0.92 for Agatston scoring.

Who?

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Guidelines Screening

Yes

>40 years

Asymptomatic

Intermediate 7.5 to 20% ASCVD risk

-Reclassify Risk in 1 of 4 people*

Maybe

5-7.5% if:

Premature Family ASCVD

Other accelerant of atherosclerosis

Maybe Not

<2.5% risk

-Reclassify 1 in 79**

2.6% to 5.0% risk

-Reclassify 1 in 44**

>20% risk

-Treat them!

Symptomatic

*JACC 2010 Oct 19;56(17):1397-406.

**JACC Cardiovasc Imaging. 2012;5(9):923.

Therefore what?

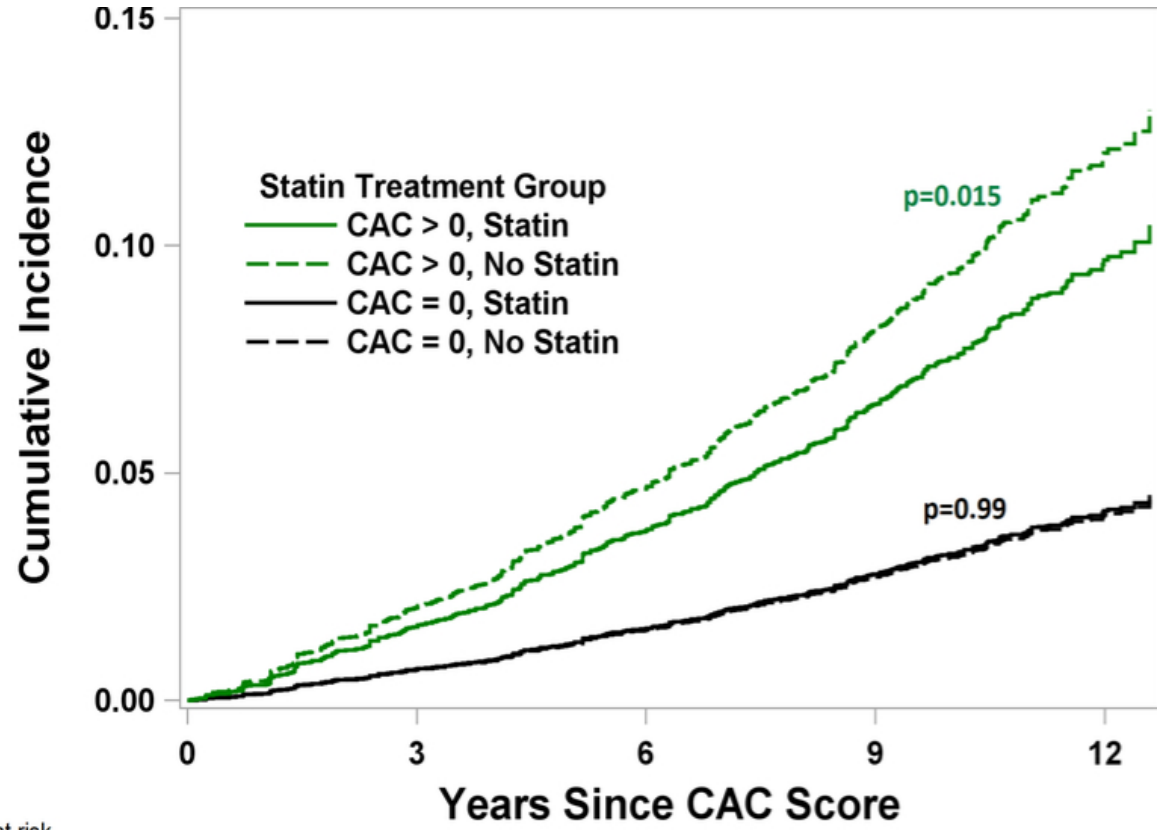
Lifestyle and Medications

Statins

CAC >100*

NNT: 12 (10 years)

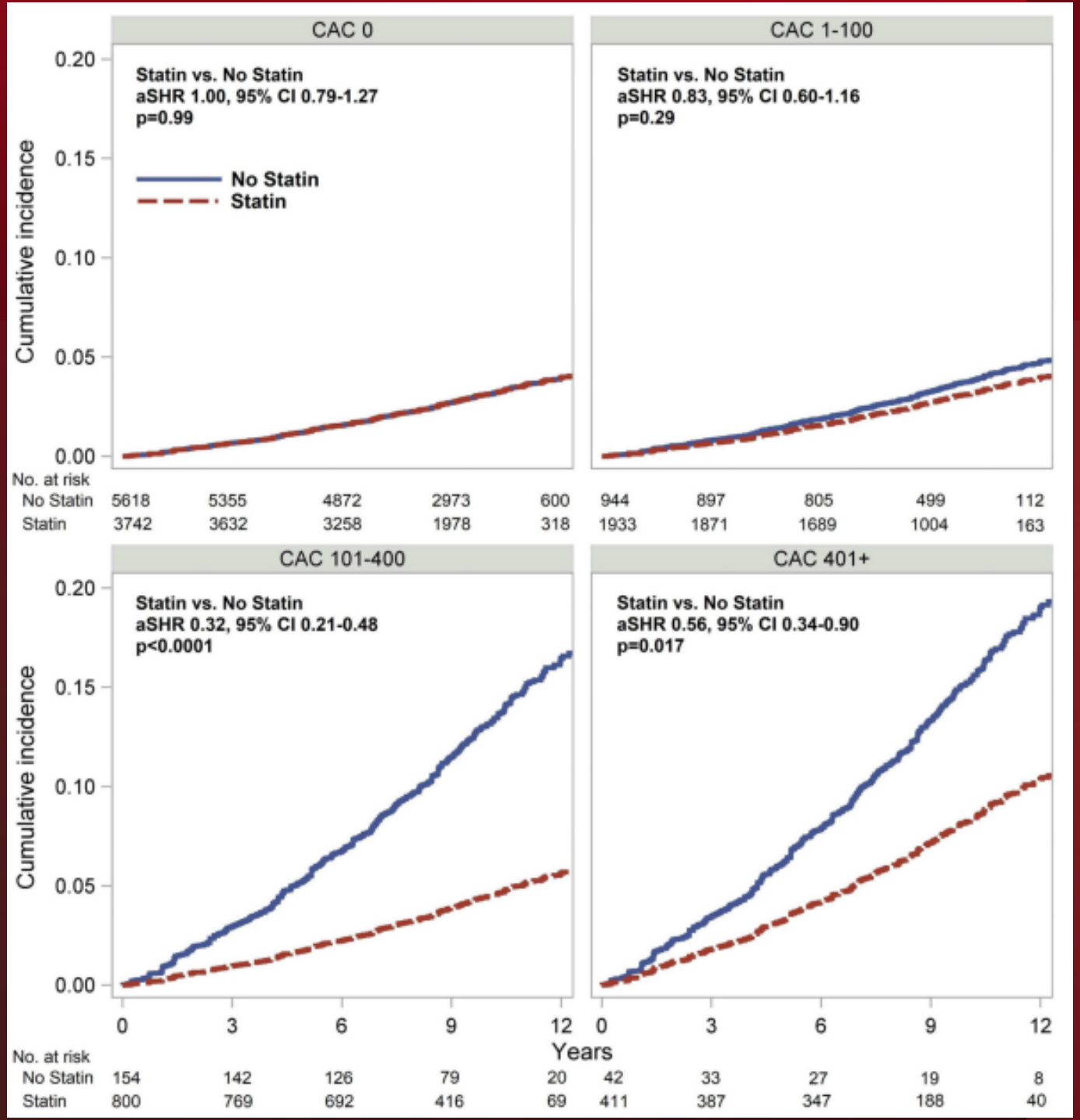
-MI, CV death, stroke



No. at risk					
CAC > 0, No Statin	1140	1072	958	597	140
CAC > 0, Statin	3144	3027	2728	1608	272
CAC = 0, No Statin	5618	5355	4872	2973	600
CAC = 0, Statin	3742	3632	3258	1978	318

*J Am Coll Cardiol 2018; 72:3233.

Circulation* 2014; **129: 77.


CAC 0
Statin vs. No Statin
aSHR 1.00, 95% CI 0.79-1.27
p=0.99
No Statin
Statin
CAC 1-100
Statin vs. No Statin
aSHR 0.83, 95% CI 0.60-1.16
p=0.29
CAC 101-400
Statin vs. No Statin
aSHR 0.32, 95% CI 0.21-0.48
p<0.0001
CAC 401+
Statin vs. No Statin
aSHR 0.56, 95% CI 0.34-0.90
p=0.017
Cumulative incidence
0.00
0.05
0.10
0.15
0.20
No. at risk
No Statin 5618 5355 4872 2973 600
Statin 3742 3632 3258 1978 318
944 897 805 499 112
1933 1871 1689 1004 163
No. at risk
No Statin 154 142 126 79 20
Statin 800 769 692 416 69
42 33 27 19 8
411 387 347 188 40
0 3 6 9 12
Years

What about statins?

Meta-analysis 2004

-Simvastatin/Lovastatin (90%)

-% difference from placebo (19% to 37%)

-<100mg/dl

-0.3 to 6.1 years

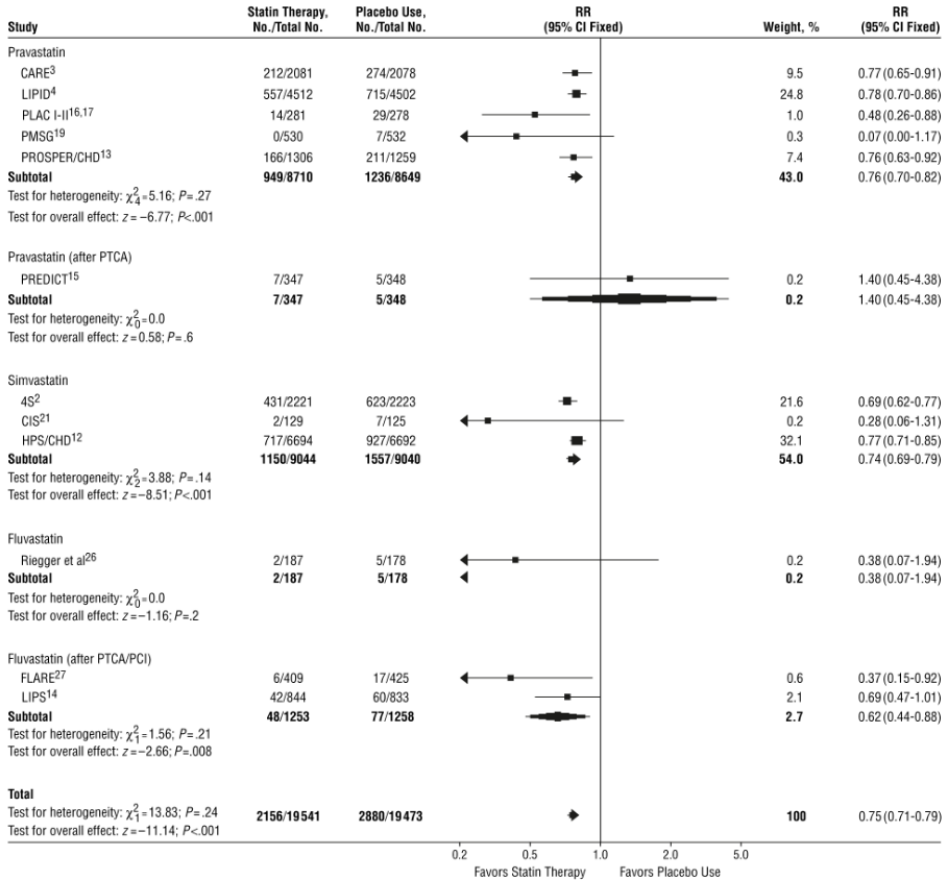
-69K people with CAD

Conclusions

CAD death/MI: NNT 26 over 4 years

All Cause Mortality: 16% reduction

All pre-treatment LDL levels benefited



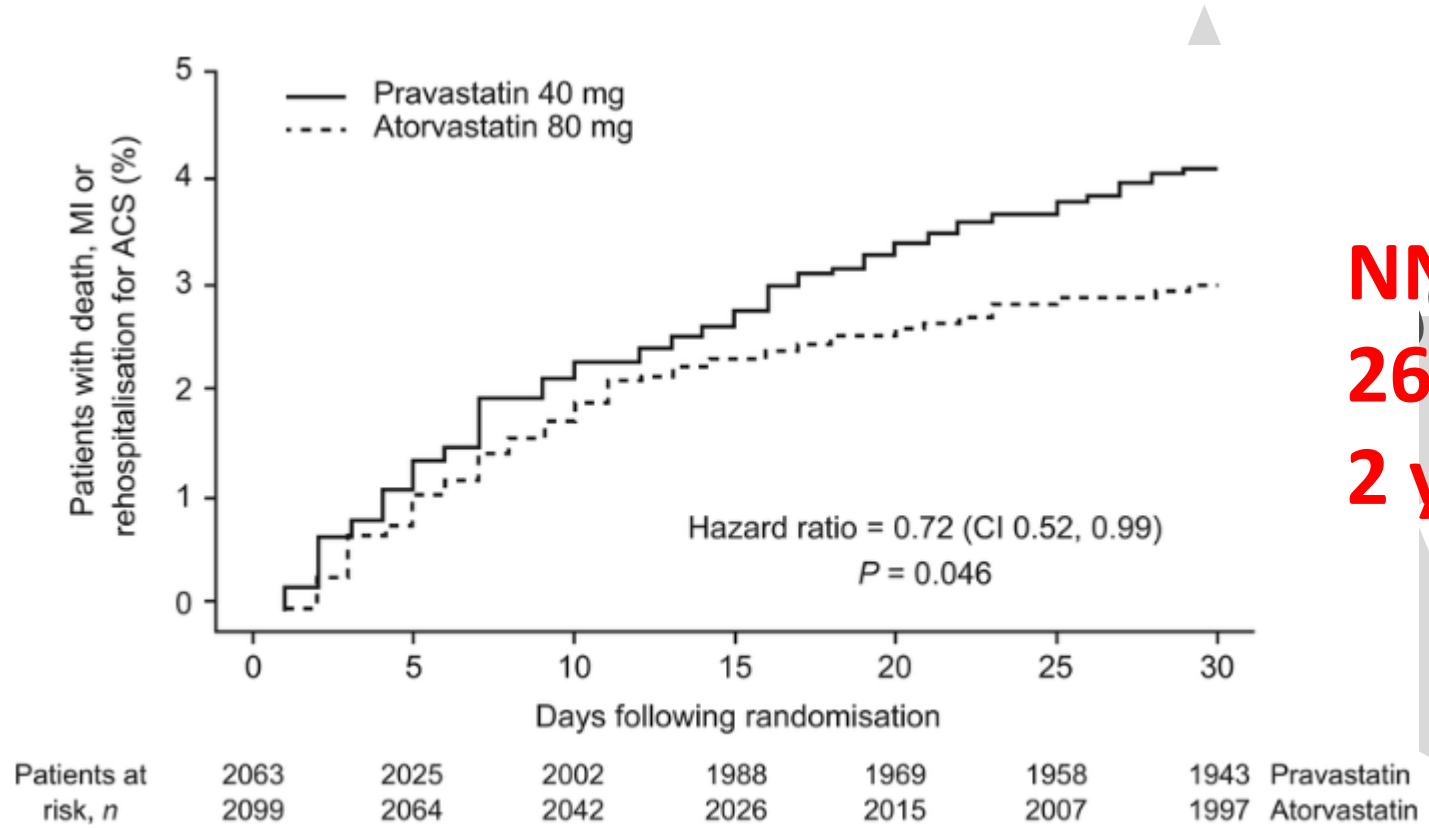
Study	Statin Therapy, No./Total No.	Placebo Use, No./Total No.	RR (95% CI Fixed)	Weight, %	RR (95% CI Fixed)
Pravastatin					
CARE[3]	212/2081	274/2078		9.5	0.77 (0.65-0.91)
LIPID[4]	557/4512	715/4502		24.8	0.78 (0.70-0.86)
PLAC I-II[16,17]	14/281	29/278		1.0	0.48 (0.26-0.88)
PMSG[19]	0/530	7/532		0.3	0.07 (0.00-1.17)
PROSPER/CHD[13]	166/1306	211/1259		7.4	0.76 (0.63-0.92)
Subtotal	**949/8710**	**1236/8649**		**43.0**	0.76 (0.70-0.82)
Test for heterogeneity: χ^2_4=5.16; P=.27					
Test for overall effect: z=−6.77; P<.001					
Pravastatin (after PTCA)					
PREDICT[15]	7/347	5/348		0.2	1.40 (0.45-4.38)
Subtotal	**7/347**	**5/348**		**0.2**	1.40 (0.45-4.38)
Test for heterogeneity: χ^2_0=0.0					
Test for overall effect: z=0.58; P=.6					
Simvastatin					
4S[2]	431/2221	623/2223		21.6	0.69 (0.62-0.77)
CIS[21]	2/129	7/125		0.2	0.28 (0.06-1.31)
HPS/CHD[12]	717/6694	927/6692		32.1	0.77 (0.71-0.85)
Subtotal	**1150/9044**	**1557/9040**		**54.0**	0.74 (0.69-0.79)
Test for heterogeneity: χ^2_2=3.88; P=.14					
Test for overall effect: z=−8.51; P<.001					
Fluvastatin					
Riegger et al[26]	2/187	5/178		0.2	0.38 (0.07-1.94)
Subtotal	**2/187**	**5/178**		**0.2**	0.38 (0.07-1.94)
Test for heterogeneity: χ^2_0=0.0					
Test for overall effect: z=−1.16; P=.2					
Fluvastatin (after PTCA/PCI)					
FLARE[27]	6/409	17/425		0.6	0.37 (0.15-0.92)
LIPS[14]	42/844	60/833		2.1	0.69 (0.47-1.01)
Subtotal	**48/1253**	**77/1258**		**2.7**	0.62 (0.44-0.88)
Test for heterogeneity: χ^2_1=1.56; P=.21					
Test for overall effect: z=−2.66; P=.008					
Total					
Test for heterogeneity: χ^2_{11}=13.83; P=.24	**2156/19541**	**2880/19473**		**100**	0.75 (0.71-0.79)
Test for overall effect: z=−11.14; P<.001					

0.2 0.5 1.0 2.0 5.0

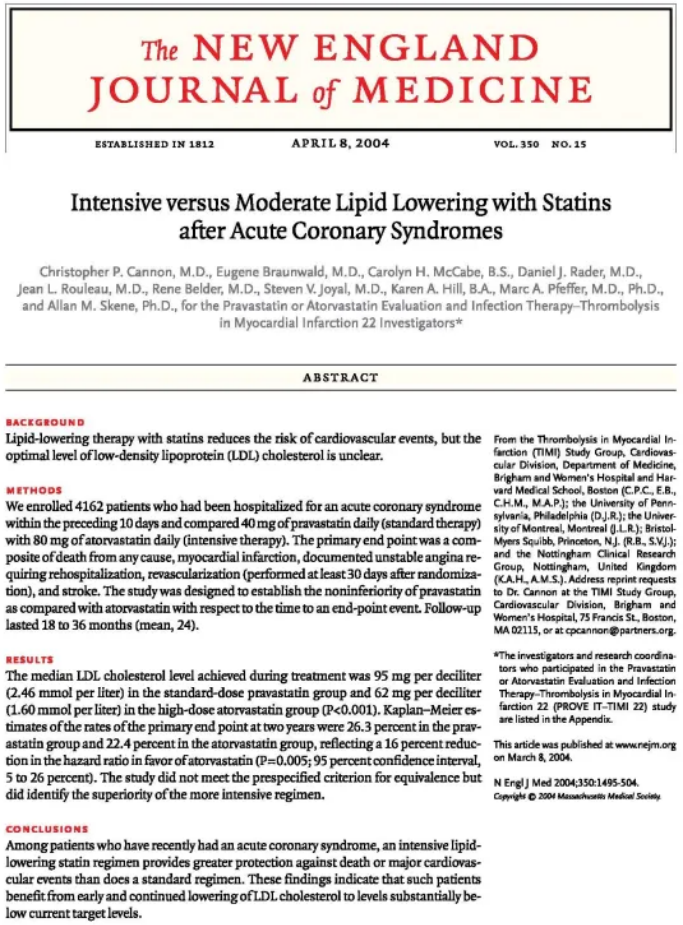
Favors Statin Therapy Favors Placebo Use

Arch Intern Med 2004;164;(13):1427-1436

Prove It Results



NNT:
26 over
2 years



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Intensive versus Moderate Lipid Lowering with Statins after Acute Coronary Syndromes

Christopher P. Cannon, M.D., Eugene Braunwald, M.D., Carolyn H. McCabe, B.S., Daniel J. Rader, M.D., Jean L. Rouleau, M.D., Rene Belder, M.D., Steven V. Joyal, M.D., Karen A. Hill, B.A., Marc A. Pfeffer, M.D., Ph.D., and Allan M. Skene, Ph.D., for the Pravastatin or Atorvastatin Evaluation and Infection Therapy–Thrombolysis in Myocardial Infarction 22 Investigators*

ABSTRACT

BACKGROUND
Lipid-lowering therapy with statins reduces the risk of cardiovascular events, but the optimal level of low-density lipoprotein (LDL) cholesterol is unclear.

METHODS
We enrolled 4162 patients who had been hospitalized for an acute coronary syndrome within the preceding 10 days and compared 40 mg of pravastatin daily (standard therapy) with 80 mg of atorvastatin daily (intensive therapy). The primary end point was a composite of death from any cause, myocardial infarction, documented unstable angina requiring rehospitalization, revascularization (performed at least 30 days after randomization), and stroke. The study was designed to establish the noninferiority of pravastatin as compared with atorvastatin with respect to the time to an end-point event. Follow-up lasted 18 to 36 months (mean, 24).

RESULTS
The median LDL cholesterol level achieved during treatment was 95 mg per deciliter (2.46 mmol per liter) in the standard-dose pravastatin group and 62 mg per deciliter (1.60 mmol per liter) in the high-dose atorvastatin group (P<0.001). Kaplan–Meier estimates of the rates of the primary end point at two years were 26.3 percent in the pravastatin group and 22.4 percent in the atorvastatin group, reflecting a 16 percent reduction in the hazard ratio in favor of atorvastatin (P=0.005; 95 percent confidence interval, 5 to 26 percent). The study did not meet the prespecified criterion for equivalence but did identify the superiority of the more intensive regimen.

CONCLUSIONS
Among patients who have recently had an acute coronary syndrome, an intensive lipid-lowering statin regimen provides greater protection against death or major cardiovascular events than does a standard regimen. These findings indicate that such patients benefit from early and continued lowering of LDL cholesterol to levels substantially below current target levels.

From the Thrombolysis in Myocardial Infarction (TIMI) Study Group, Cardiovascular Division, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston (C.P.C., E.B., C.H.M., M.A.P.); the University of Pennsylvania, Philadelphia (D.J.R.); the University of Montreal, Montreal (J.L.R.); Bristol-Myers Squibb, Princeton, N.J. (R.B., S.V.J.); and the Nottingham Clinical Research Group, Nottingham, United Kingdom (K.A.H., A.M.S.). Address reprint requests to Dr. Cannon at the TIMI Study Group, Cardiovascular Division, Brigham and Women's Hospital, 75 Francis St., Boston, MA 02115, or at cpcannon@partners.org.

*The investigators and research coordinators who participated in the Pravastatin or Atorvastatin Evaluation and Infection Therapy–Thrombolysis in Myocardial Infarction 22 (PROVE IT–TIMI 22) study are listed in the Appendix.

This article was published at www.nejm.org on March 8, 2004.

N Engl J Med 2004;350:1495-504.

N Engl J Med. 2004 Apr 8;350(15):1495-504.

Aspirin

CAC >100 or >75%ile for age/gender

Why: >7.5%ile for ASCVD events*

Aspirin <70 **

CAC 0:

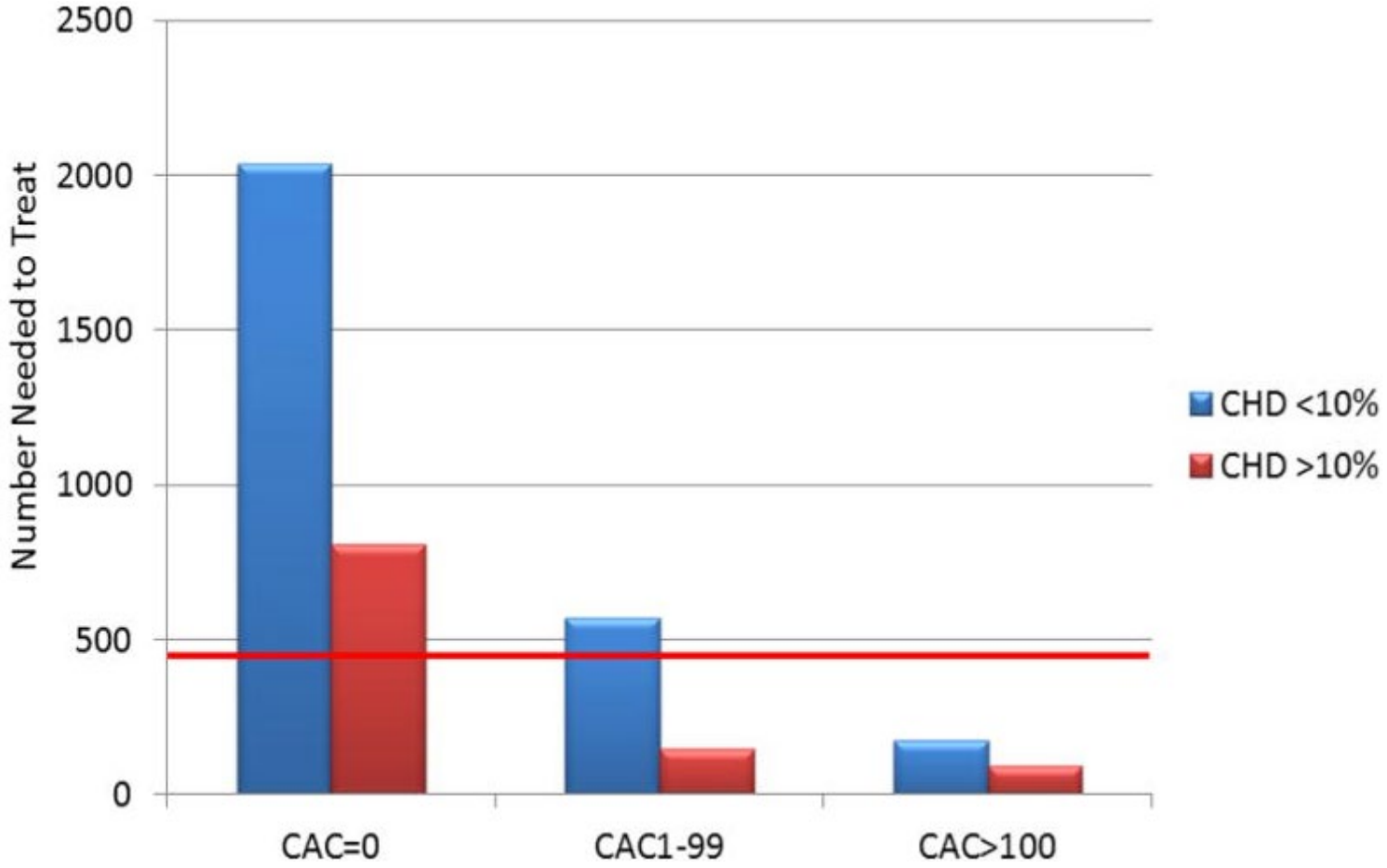
NNT 1 in 2036

NNH 1 in 442

CAC >100

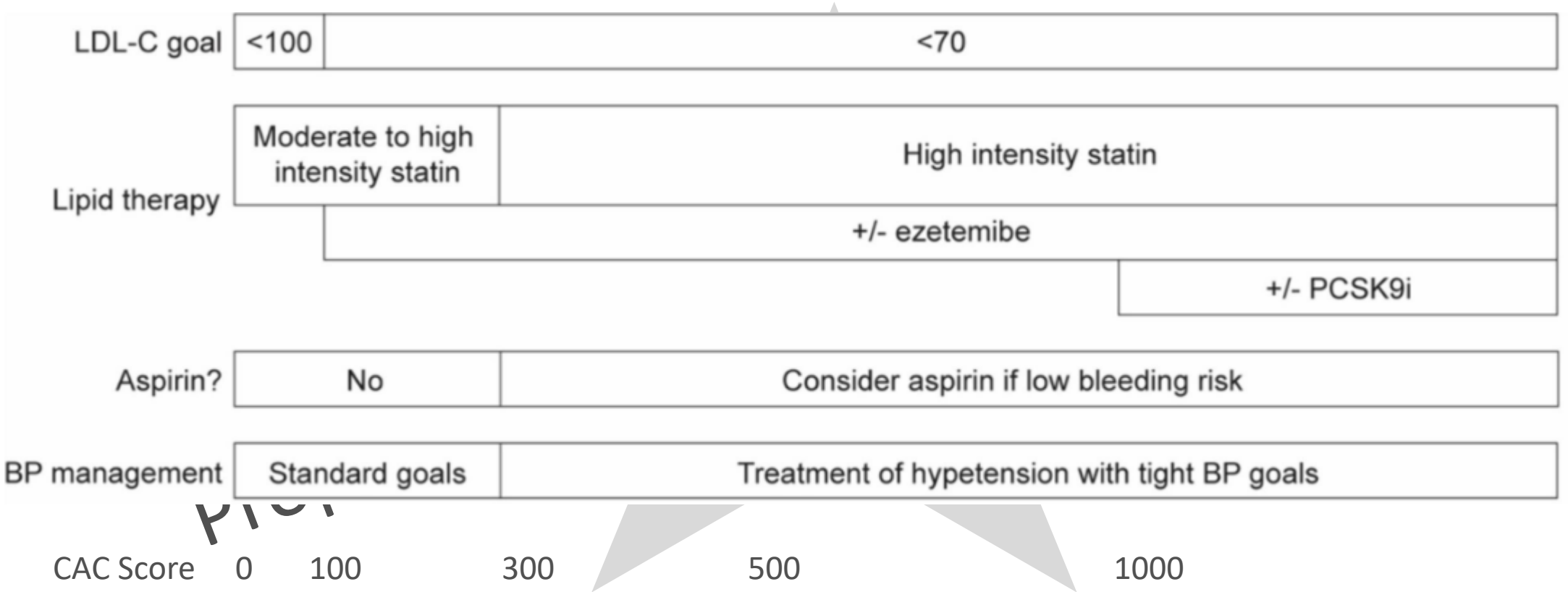
NNT 1 in 92

NNH 1 in 442



*Eur Heart J. 2018;39(25):2401. **Circ Cardiovasc Qual Outcomes. 2014;7(3):453

Treatment Guidelines



Circ Cardiovasc Qual Outcomes, 15 (6) (2022)

My opinion

Coronary calcium scoring should be used more than we use it now.

Cardiovascular disease is the #1 cause of death in the world

We screen for other things with less incidence

Individualized CV risk assessment needs to include Lipoprotein(a) as well as coronary artery calcium scoring.

What about smoking?

Tobacco: MI, CABG, PCI, Stable CAD

12,603 smokers

5,659 quit vs 6,944 who continued

36% reduction in mortality

Independent of age, gender, type of coronary disease

NNT: 11 people over 9 years

JAMA 2003 Jul 2;290(1):86-97

What about smoking anything?

Marijuana: 1/3rd more likely for MI*

Vaping: 2 x more likely for MI**

Chewing Tobacco: 2 x more likely for an MI***

Second Hand smoke: 1.5 x more likely for an MI****

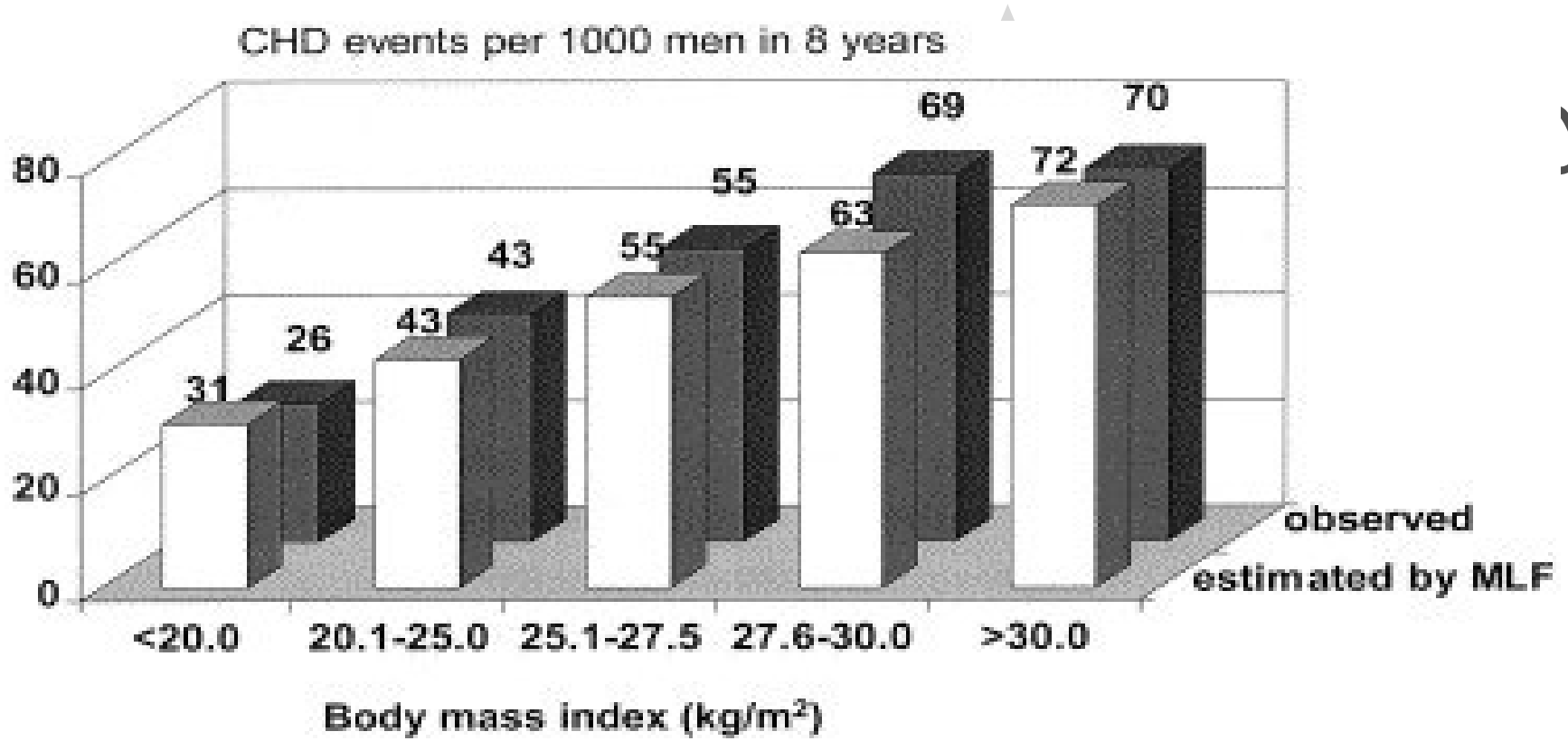
Association of Cannabis Use Disorder With Risk of Coronary Artery Disease: A Mendelian Randomization Study, 2023

**American Journal of Preventive Medicine Volume 55, Issue 4, October 2018, Pages 455-461

***Koon et al, The Lancet 268(9536):647

****Interheart study

What about weight loss?



)26

Atherosclerosis. 1999;144(1):199

No clear benefit on weight reduction and MI

What about waist loss!

Three things:

1. Know how many calories to eat a day to lose weight

-Artificial Intelligence

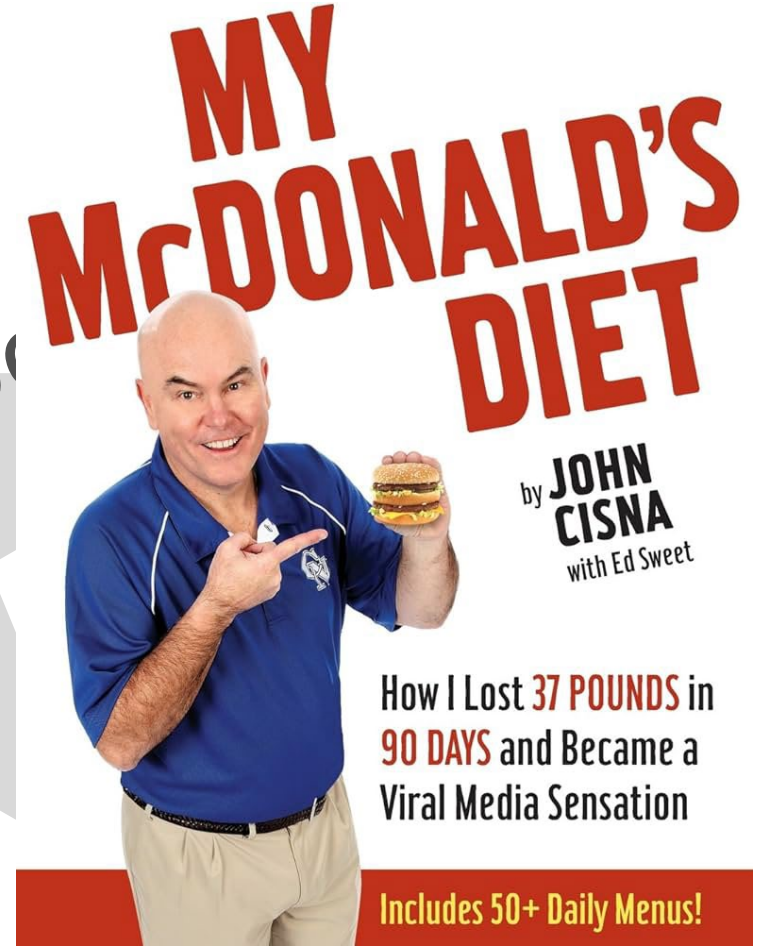
2. Know how many calories you're eating a day

-400 calorie rule

3. Exercise and Protein

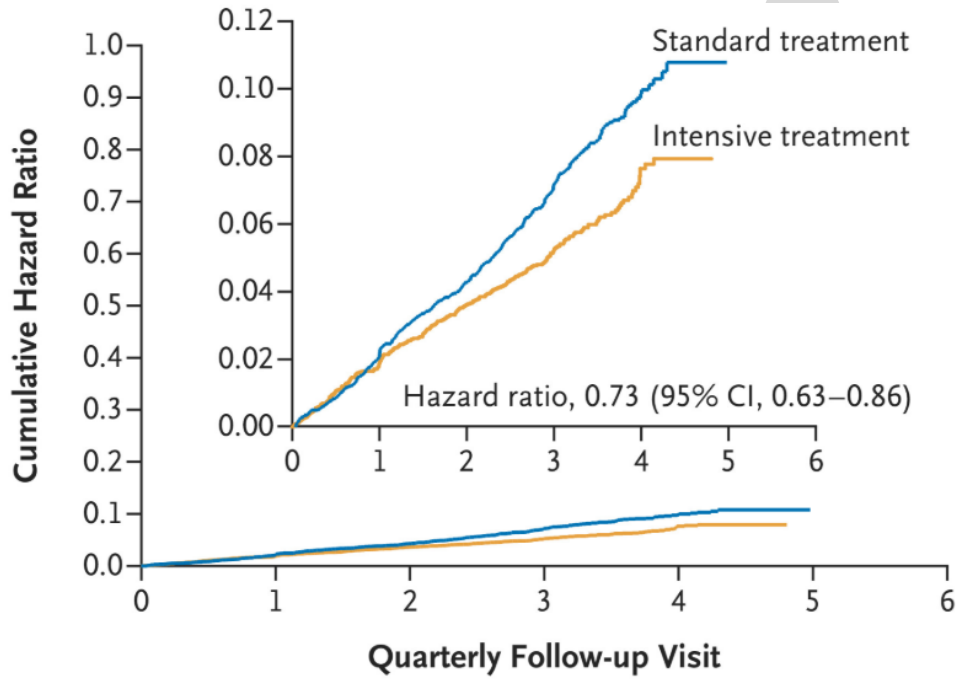
-One, two, three…

-Over half your body weight (lb) in grams



What about Blood Pressure?

Goal <130/80mmHg, ideally systolic <120mmHg



No. at Risk

Standard treatment	4683	4443	4247	2950	801	120
Intensive treatment	4678	4439	4275	3028	855	125

Composite of MI, Stroke, CHF, CV death: -2%
All cause mortality: -1.1%
Syncope: +1.1%
Hyponatremia: +1.8%

Trial stopped early at 3.3 years
NNT: 63

N Engl J Med. 2021;384(20):1921.

What about blood pressure?

Weight loss

Eat a high-fiber diet with plenty of fruits and vegetables.

Eat less than 2400 mg of sodium daily.

Accumulate 90 minutes of vigorous aerobic activity over a week.

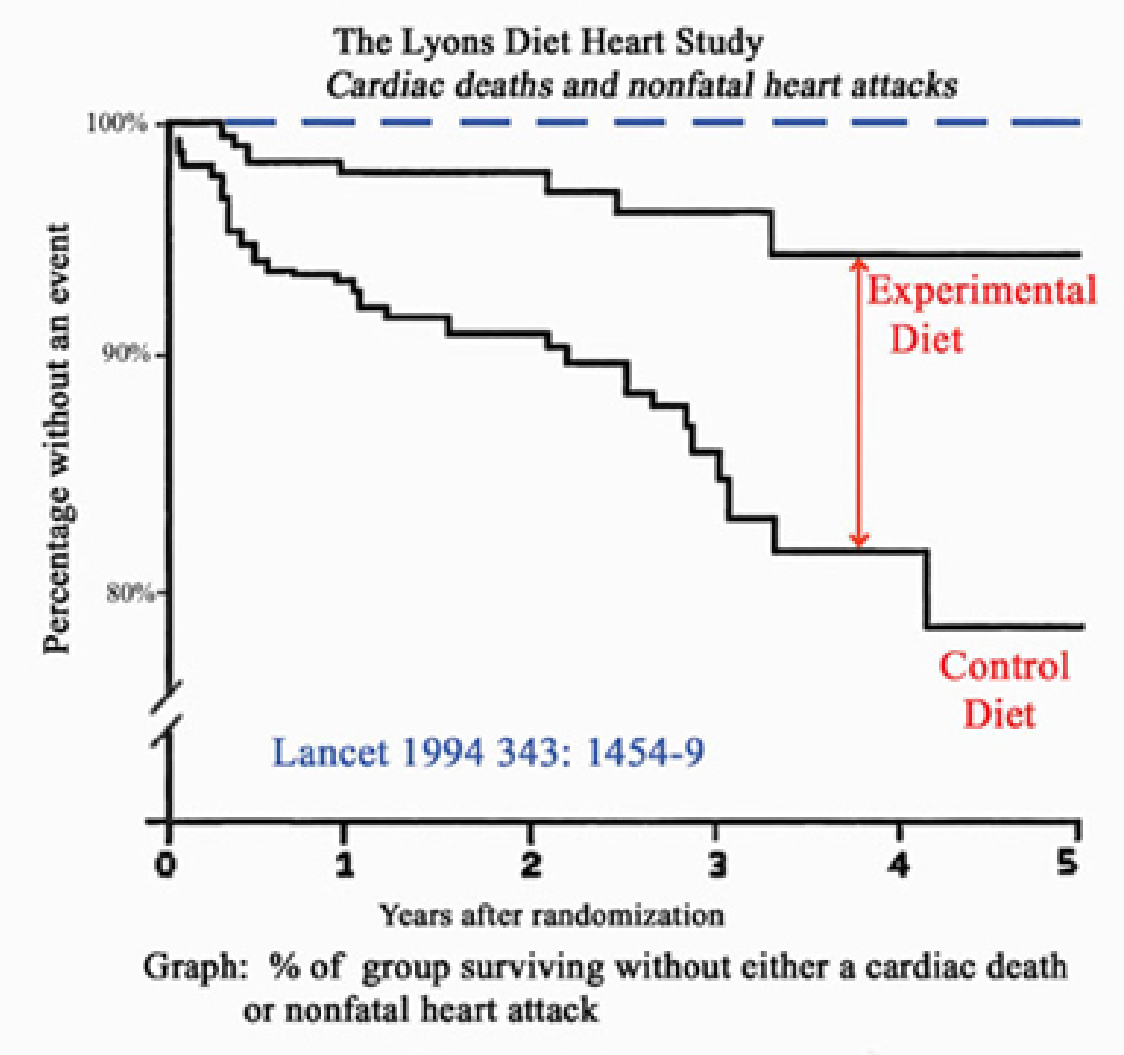
Eliminate alcohol/smoking.

Avoid daily NSAID use

Avoid processed foods

Express gratitude

What about food?



Graph: % of group surviving without either a cardiac death or nonfatal heart attack

NNT over 27 months: 12

NNT over 5 years: 5

Diet:

Seeds

Nuts

Oils (Canola, Olive)

Legumes/Vegetables

Fruits

Fish/Chicken

Less Red meat

Whole Grain breads

What about Food?

Emphasize Healthy Fats

-Fish, nuts, avocados, olive oil

Beans, seeds, legumes

Fruits and Vegetables

Whole grains

Plant based proteins

-Quinoa, edamame, nuts (pistachios)

Avoid:

Southern Diet: Fried foods, processed meats, sweet tea, refined grains

Western Diet: red/processed meats, refined grains, high sodium, sugar

•. 2021 Nov 6;11(11
•. 2021 Nov 6;11(11

What about exercise

One

-Daily walking (8,800 steps)

Two

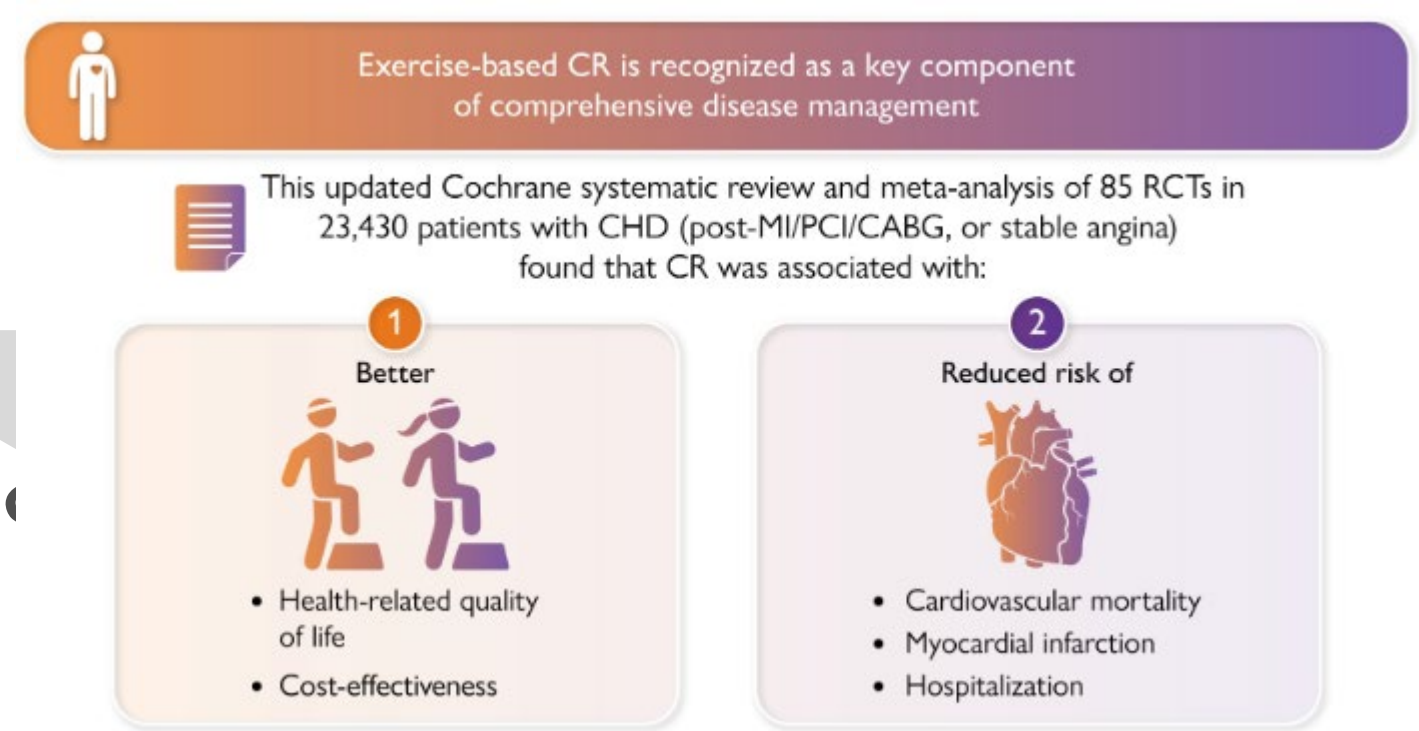
-Strength Train 2 x's week

-20-30 minutes

Three

-Aerobic/HITT 3 x's week

-30 minutes



EHJ 44(6) 2023: 452-469


Property of Spring Symposium 2026