

Risk Stratification and Statins in the Primary Prevention of Coronary Heart Disease

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Cardiology Fellows

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Objectives

- ❖ Understand the PREVENT risk calculator
- ❖ Role of additional risk factors in risk stratification
- ❖ Role of diagnostic testing in risk stratification
- ❖ Review some cases

US Burden of Heart Disease

❖ Each year:

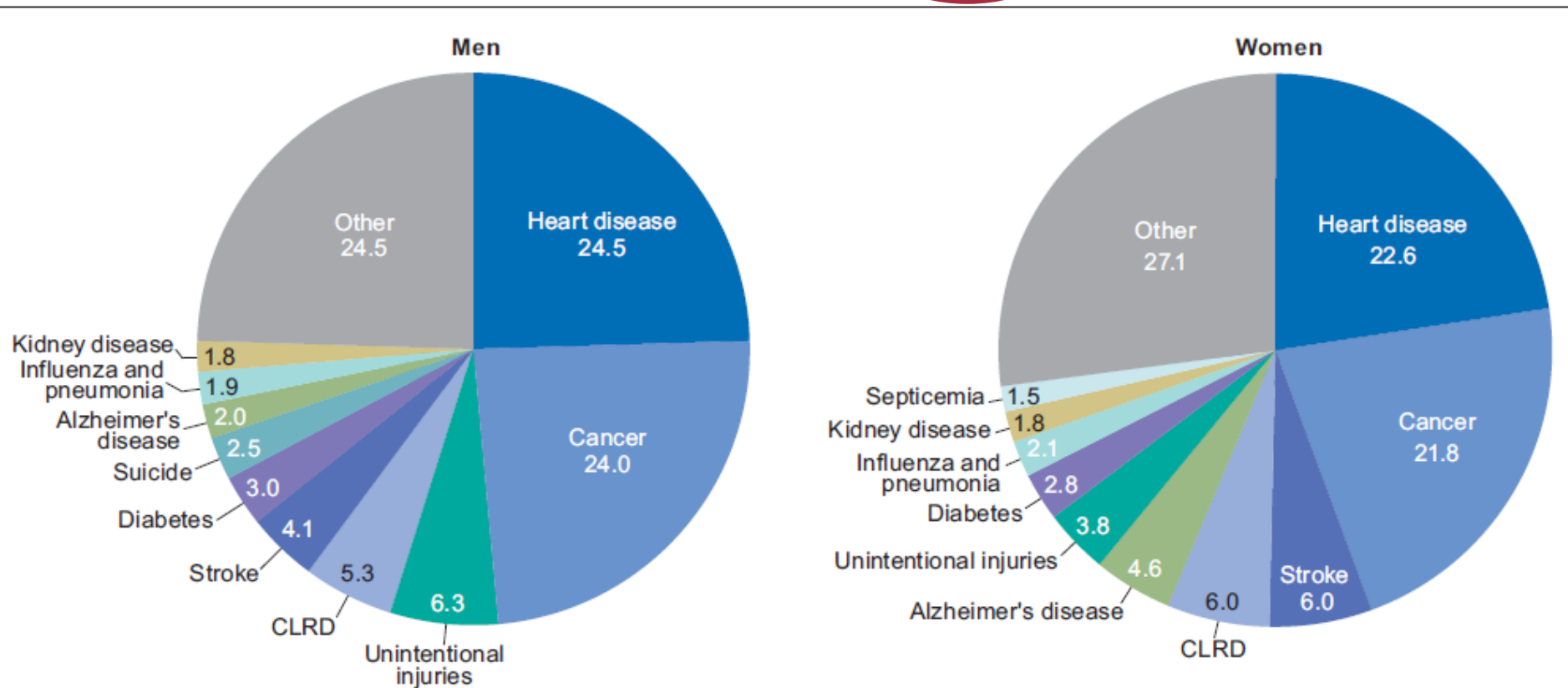
- 600,000 patients die from heart disease
- 1.2 million are hospitalized with a heart attack, heart stent, bypass surgery, or valve surgery
- Another 1.0 million are hospitalized with heart failure

❖ Each year:

- \$350 billion is spent on heart disease

Deaths, 2012

- ❖ 2,543,000 deaths in the United States
- ❖ Heart disease (#1), Stroke #3
- ❖ $599,000 + 143,000 = 29.1\%$



29%

- ❖ This means that if you:
 - Eat an average diet
 - Exercise irregularly and
 - Are overweight
- ❖ You have a 1/3rd lifetime chance of dying of the “average” American heart disease
- ❖ Your “pre-test probability” or “pre-life chance” of heart disease is ~30%

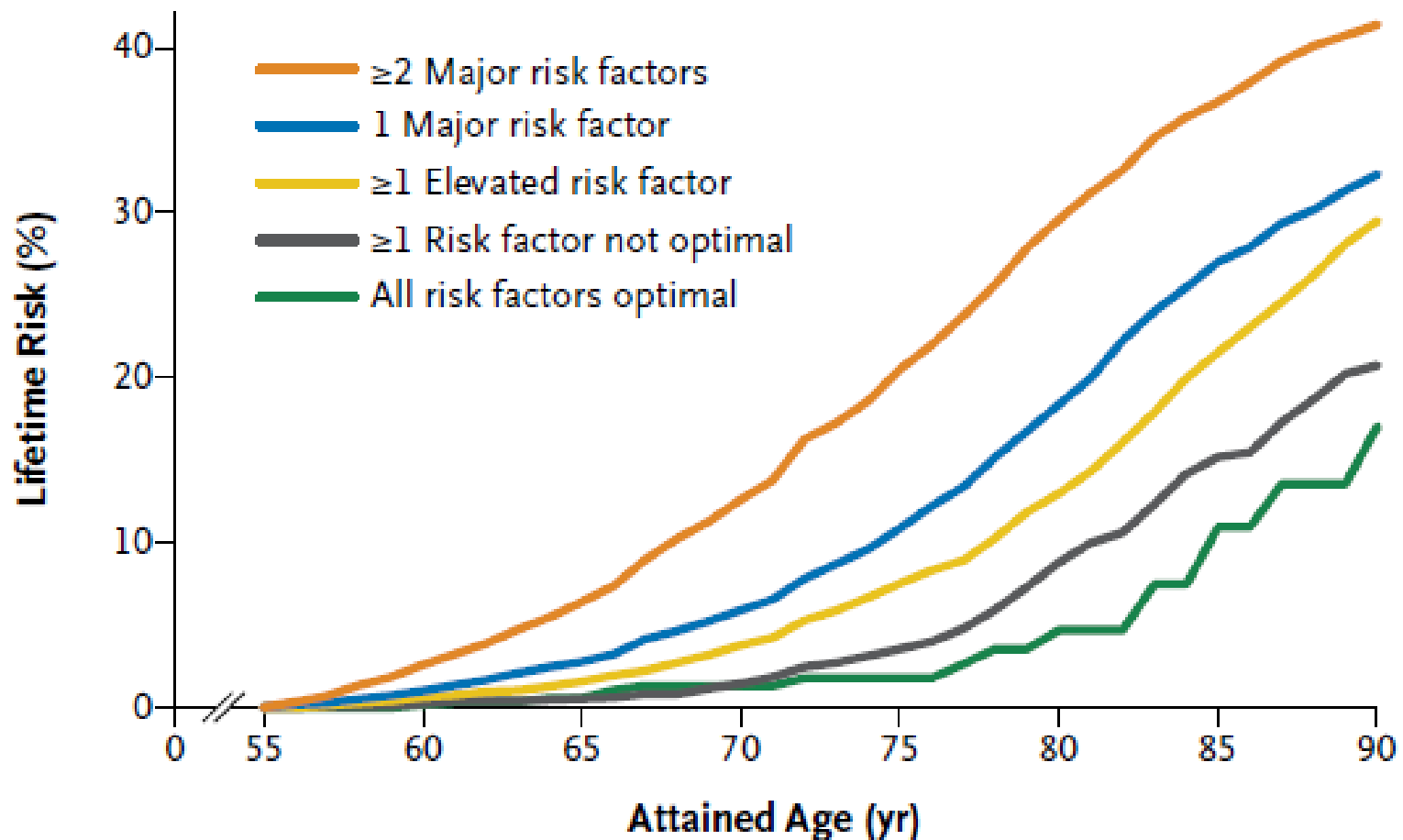


Figure 1. Lifetime Risk of Death from Cardiovascular Disease among Black Men and White Men at 55 Years of Age, According to the Aggregate Burden of Risk Factors and Adjusted for Competing Risks of Death.

Berry et al, NEJM 2012; 366:321-9

Lifetime Cumulative Risk

JAMA Cardiology | Original Investigation

Association Between Cumulative Low-Density Lipoprotein Cholesterol Exposure During Young Adulthood and Middle Age and Risk of Cardiovascular Events

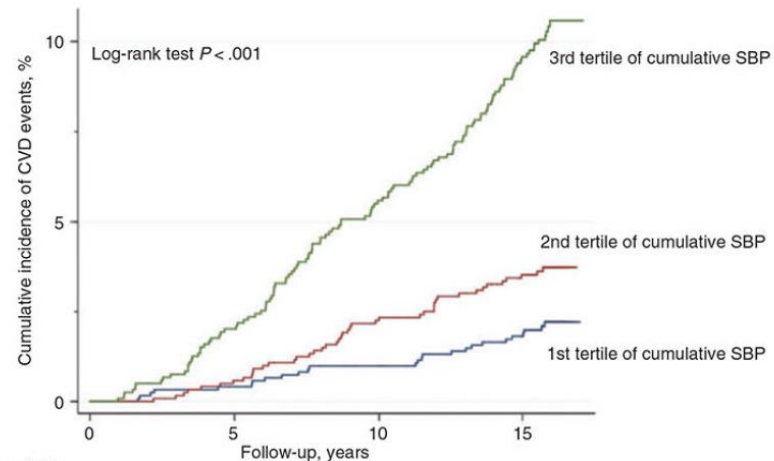
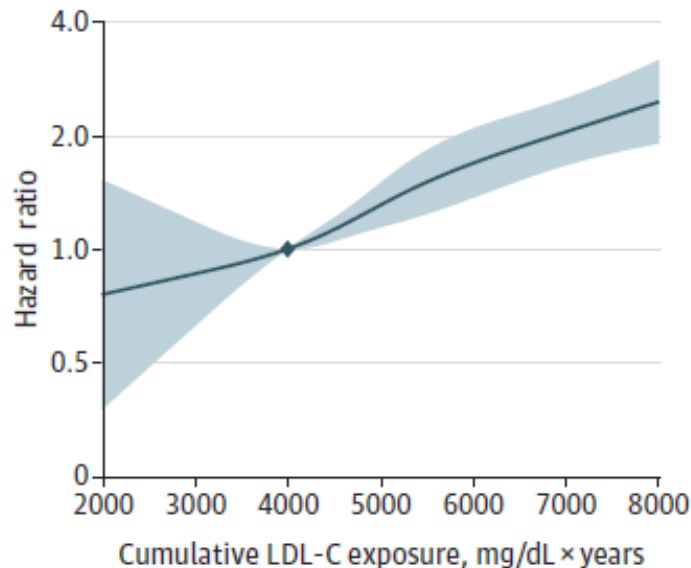
Yiyi Zhang, PhD; Mark J. Pletcher, MD, MPH; Eric Vittinghoff, PhD; /

Long-term cumulative blood pressure in young adults and incident heart failure, coronary heart disease, stroke, and cardiovascular disease: The CARDIA study

Chike C. Nwabuo¹, Duke Appiah², Henrique T. Moreira¹, Henrique D. Vasconcellos¹,

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A Cumulative LDL-C



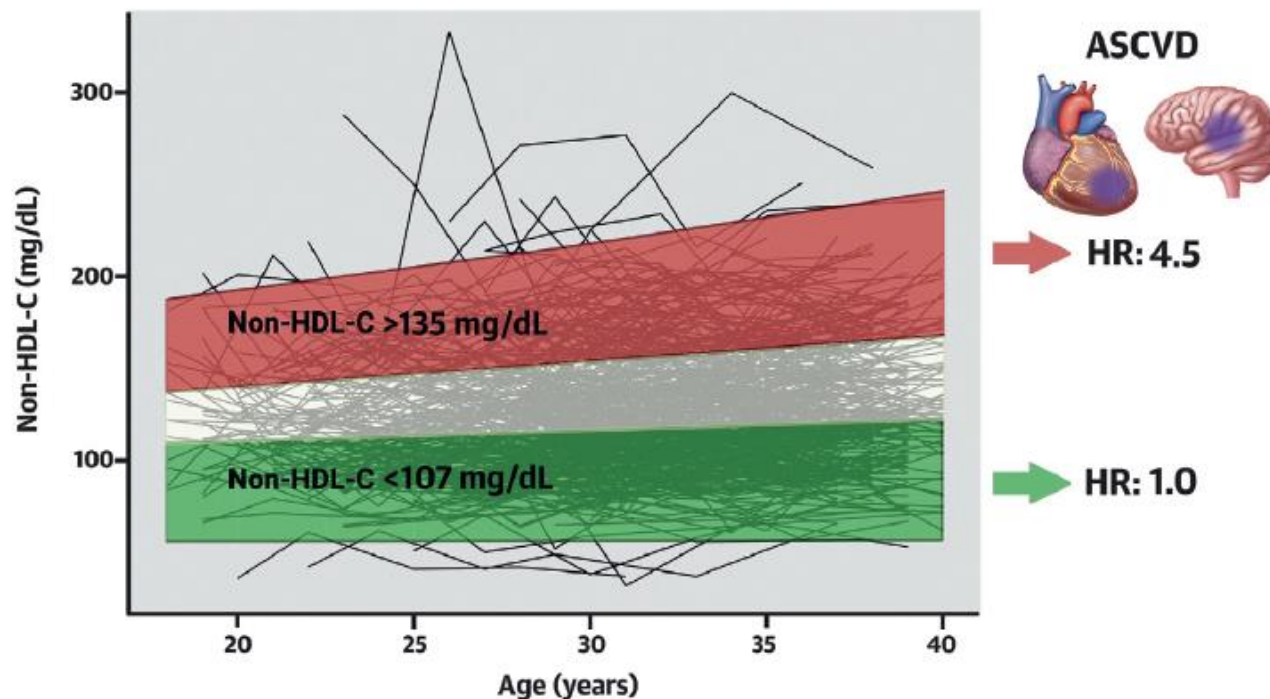
Number at risk				
1st tertile	1222	1213	1200	1156
2nd tertile	1214	1197	1164	1117
3rd tertile	1197	1158	1100	1017

Prediction of Cumulative Exposure to Atherogenic Lipids During Early Adulthood



John T. Wilkins, MD, MSc,^{a,b} Hongyan Ning, MD, MS,^b Norrina B. Allen, PhD,^b Alexander Zheutlin, MD, MPH,^a

CENTRAL ILLUSTRATION 1-Time Non-HDL Measurements in Young Adults Strongly Predict Cumulative Exposure



Wilkins JT, et al. *JACC*. 2024;84(11):961-973.

How to estimate risk?

- ❖ Guess? Gestalt? Gut sense? No!
- ❖ Risk calculator!
 - Framingham - Works great for white men
 - Reynolds - Includes hs-CRP and family history
 - SCORE – for European populations
 - PCE – Increased complexity, overestimated risk
- ❖ PREVENT risk calculator
 - Key Advantages:
 - Zip codes replaces race/ethnicity
 - Good validity, good accuracy
 - HF an outcome of interest

10 year risk of fatal CVD in low risk regions of Europe by gender, age, systolic blood pressure, total cholesterol and smoking status



PREVENT Risk Calculator

The American Heart Association PREVENT™ Online Calculator

[About the PREVENT Equations](#)

[Online Calculator](#)

CVD

ASCVD

Heart Failure

Sex*

☒ Male ☐ Female

Age (years)*

30-79

SBP (mmHg)*

90-200

Total Cholesterol (mg/dL)*

130-320

HDL Cholesterol (mg/dL)*

20-100

eGFR (mL/min/1.73m²)*

15-140

BMI (kg/m²)*

18.5-39.9

Diabetes

Any history of diabetes.

☒ No ☐ Yes

Current Smoking

Any cigarette use within the last 30 days

☒ No ☐ Yes

PREVENT Risk Calculator

Lipid-lowering medication

Current use of statin medication to lower cholesterol

☒ No ☐ Yes

Anti-hypertensive medication

Current use of any medication for hypertension

☒ No ☐ Yes

The following three predictors are optional for further personalization of risk assessment. When they are clinically indicated or available,

If available or indicated, select "Yes" and enter the value.

UACR (mg/g)

UACR is clinically indicated for individuals with chronic kidney disease, diabetes, or hypertension

☐ No ☒ Yes

0 to 25000

mg/g

HbA1C

HbA1c is clinically indicated for individuals with diabetes, prediabetes, overweight, or obesity, or those with history of gestational diabetes

☐ No ☒ Yes

3 to 15

%

Zip Code

valid 5-digit zip code is needed to estimate social deprivation index [SDI]

☐ No ☒ Yes

Enter zip code

Calculate

Reset

Lipid Treatment Risk Categories

- ❖ ACC/AHA guidelines (10-year risk)
 - Low risk <3%
 - Borderline risk 3 – 4.9%
 - Intermediate 5 – 9.9%
 - High risk 10% or higher

3% Explained

- ❖ Heart disease is responsible for 30% of the deaths in the US each year
- ❖ Death from statins is 1:1,000,000
 - You took this chance with your last road trip of 230 miles or 10-mile bike ride
 - Smoking 1.4 cigarettes
 - Single CXR (risk for cancer)
- ❖ Benefits outweigh the risks at 3%
 - Moderate intensity statin initiation would reduce absolute risk by 1-1.5% (RR of 30-40%)
- ❖ 3% cut-off chosen to allow for shared decision making

Questions?

LDL lowering and risk reduction

JAMA | Original Investigation

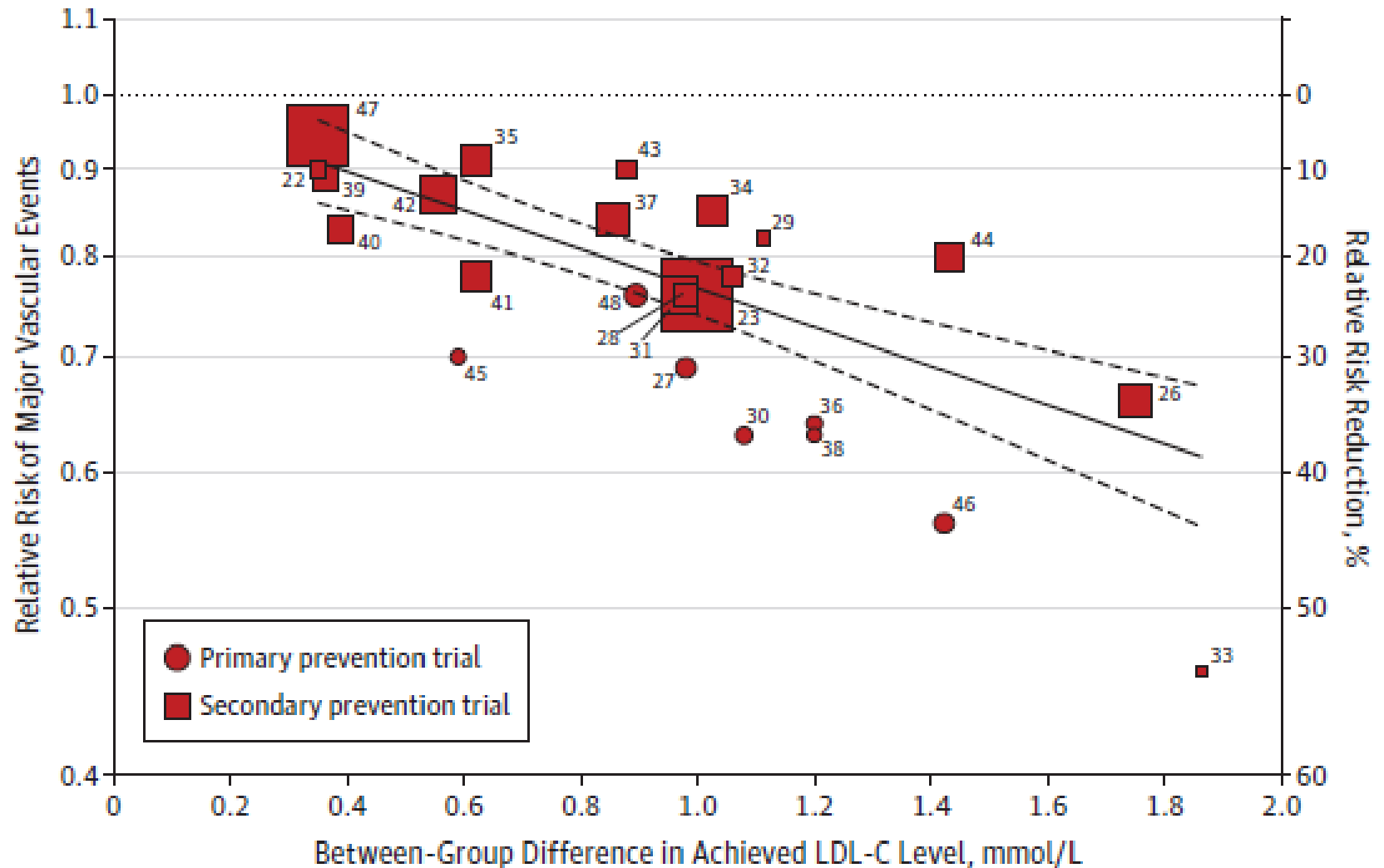
Association Between Lowering LDL-C and Cardiovascular Risk Reduction Among Different Therapeutic Interventions A Systematic Review and Meta-analysis

Michael G. Silverman, MD; Brian A. Ference, MD, MPhil, MSc; Kyungah Im, PhD; Stephen D. Wiviott, MD;
Robert P. Giugliano, MD, SM; Scott M. Grundy, MD, PhD; Eugene Braunwald, MD; Marc S. Sabatine, MD, MPH

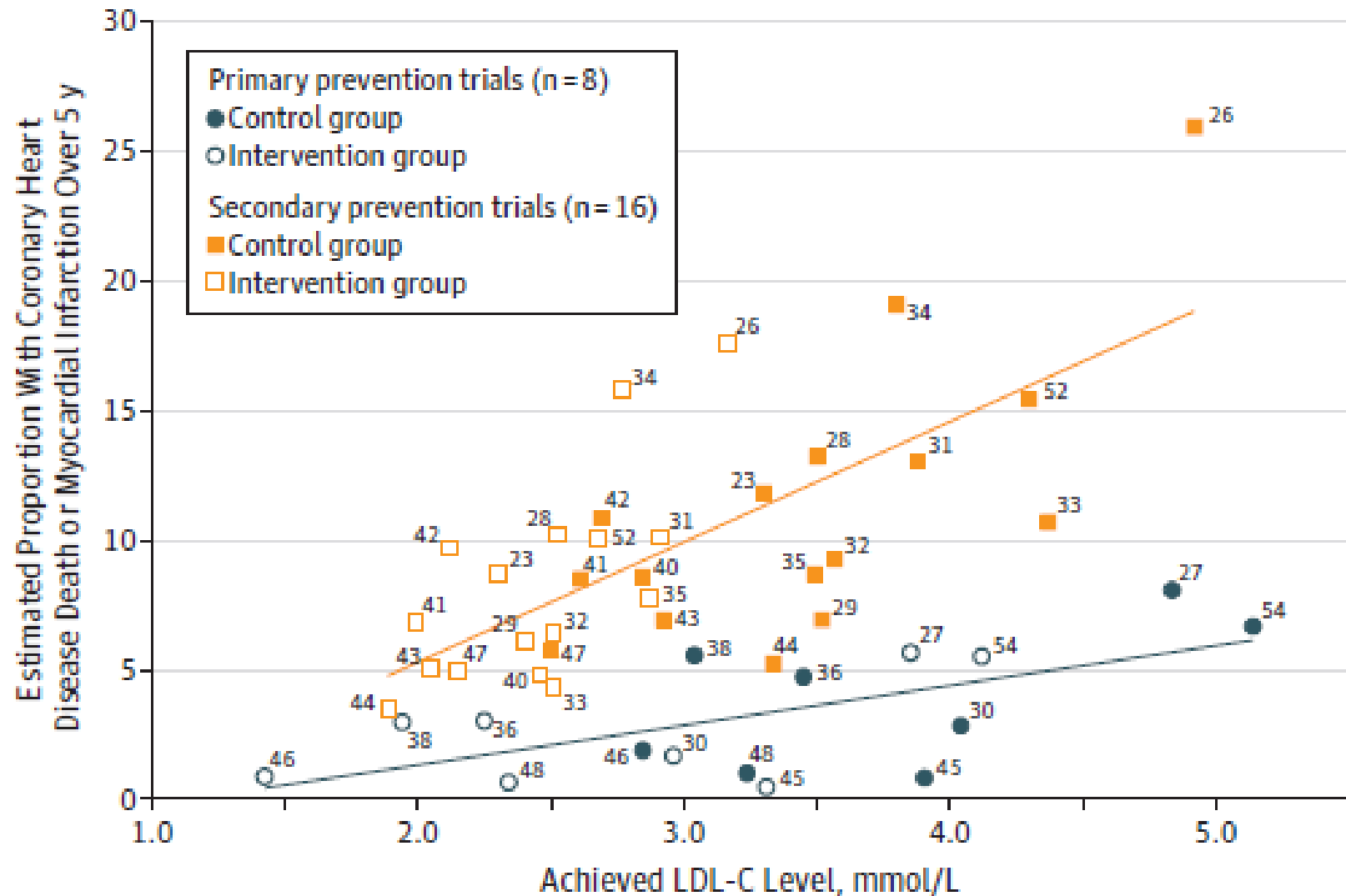
- ❖ The relative risk reduction of statins varies directly with their LDL reduction
- ❖ $\sim 40\text{mg/dL} \downarrow \text{lower LDL} = \sim 25\% \downarrow \text{risk}$

Statins

A Twenty-five statin trials

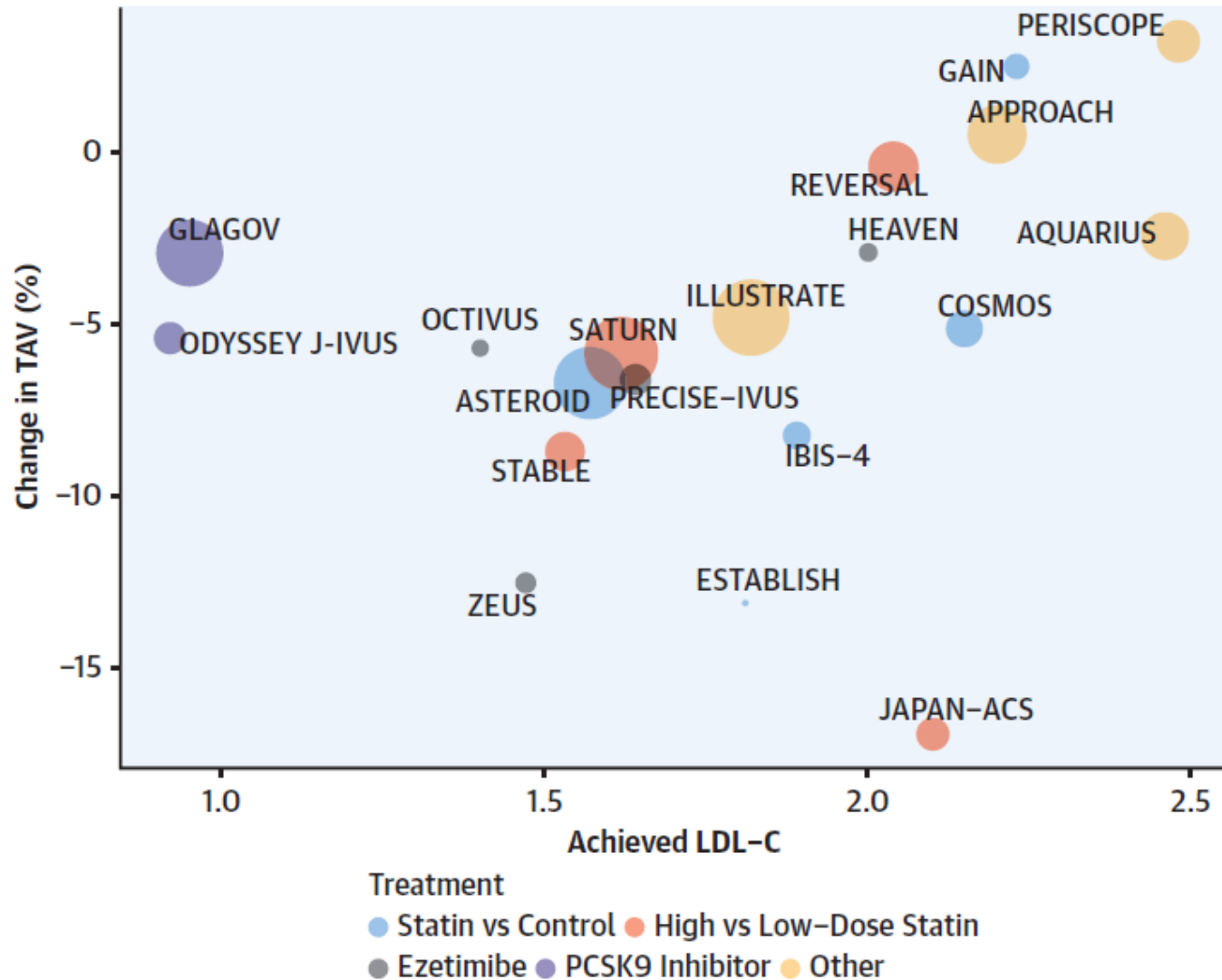


By achieved LDL level

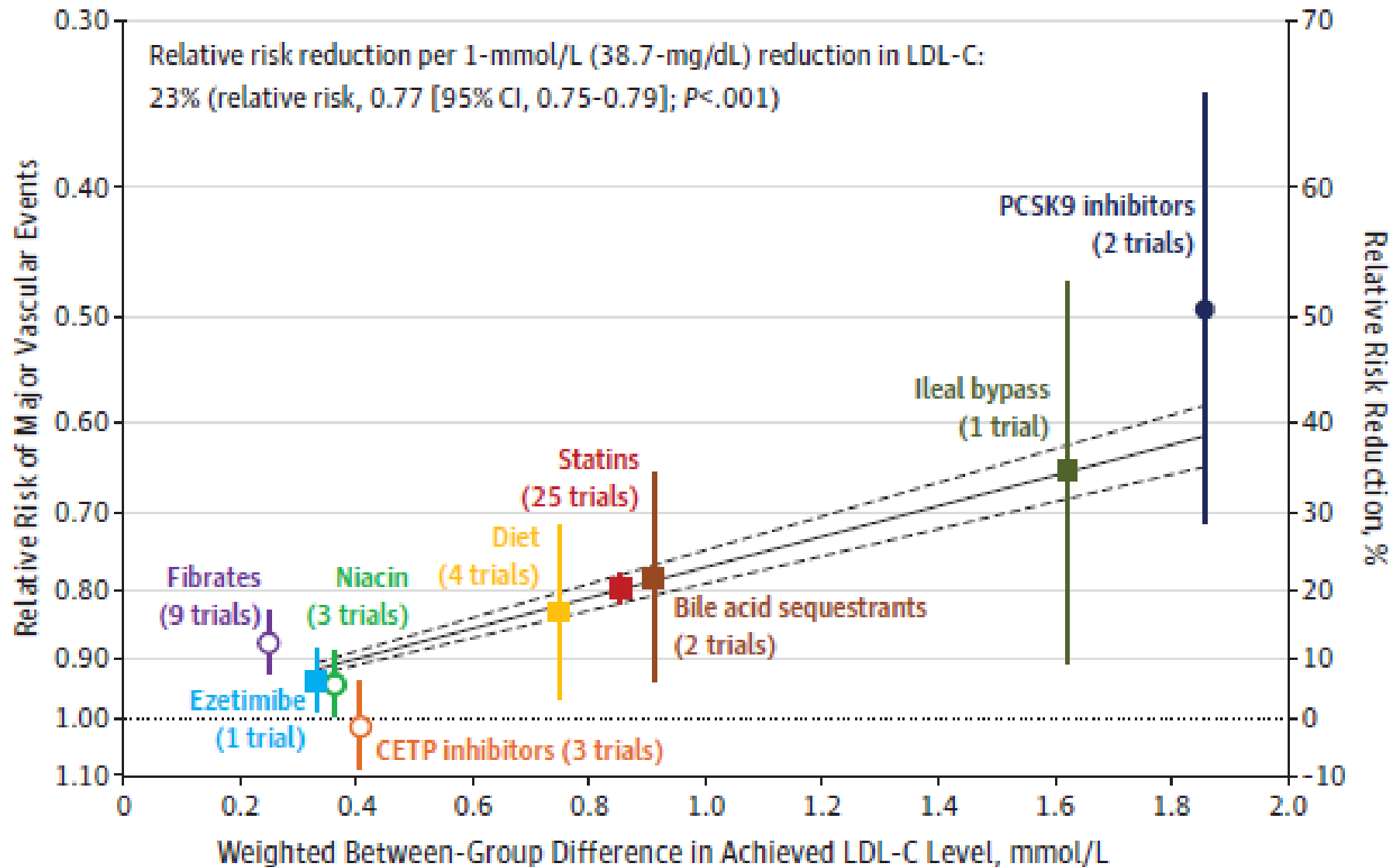


Regression of Atheroma

FIGURE 4 Correlation Between Plaque Regression/Progression and Achieved LDL-C



All Therapies



Absolute effect sizes!

- ❖ With an **8%** 10-year risk
 - High intensity statin → 50% risk reduction
 - 8% → 4%, 10-year risk
- ❖ This means that over 10 years:
 - No statin: 92% chance of NO heart attack
 - With statin: 96% chance of NO heart attack
- ❖ For some people this is not worth the potential side effects

Risk Discussion



Statin Choice Decision Aid



Current Risk

Intervention

Issues

Notes

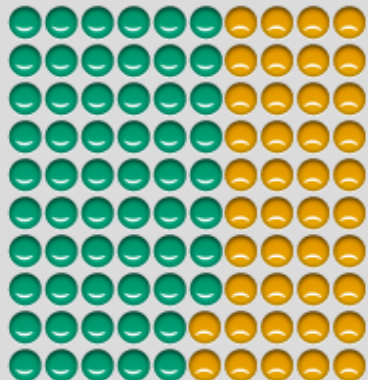
Document

Benefits vs Downsides according to my personal health information

Using **ACC/AHA ASCVD** Risk Calculator

Current Risk of having a heart attack

Risk for 100 people like you who **do not**
medicate for heart problems



Over 10 years
42 people will have a heart attack
58 people will have no heart attack

Cost

High dose statins
about \$150/month

Daily Routine

High dose statins
One pill once a day

Other Benefits

High dose statins
The use of statins reduces your
stroke risk by about one fifth.

Side Effects

High dose statins

Common side effects
nausea, diarrhea, constipation
(most patients can tolerate);

Muscle aching/stiffness
5 in 100 patients
(some need to stop statins because of this);

Liver blood test goes up
(no pain, no permanent liver damage):
2 in 100 patients
(some need to stop statins because of this);

Muscle and kidney damage
1 in 20,000 patients
(requires patients to stop statins).

The risk for these side effects may be
higher by taking high dose/intensity
statins compared to low dose statins.

Future Risk of having a heart attack

Risk for 100 people like you who do take
high dose statins



Over 10 years
25 people will have a heart attack
58 people will have no heart attack
17 people will be saved from a heart
attack by taking medicine

Advanced Risk Stratification

DIET & NUTRITION

Eating Blueberries May Reduce Your Risk of Heart Disease, Study Suggests

The findings support past research that shows the antioxidant-packed berries lower cholesterol and improve how the arteries function.



By Jessica Migala

Last Updated: June 3, 2019



Blueberries likely help keep your ticker happy by fighting inflammation, reducing oxidative damage, improving gut health, and more. *iStock*

MOST HELPFUL

[10 Ordinary Fruits With Amazing Health Benefits](#)

[11 Healthy Fall Foods — and the Best Ways to Eat Them](#)

Additional Risk Considerations

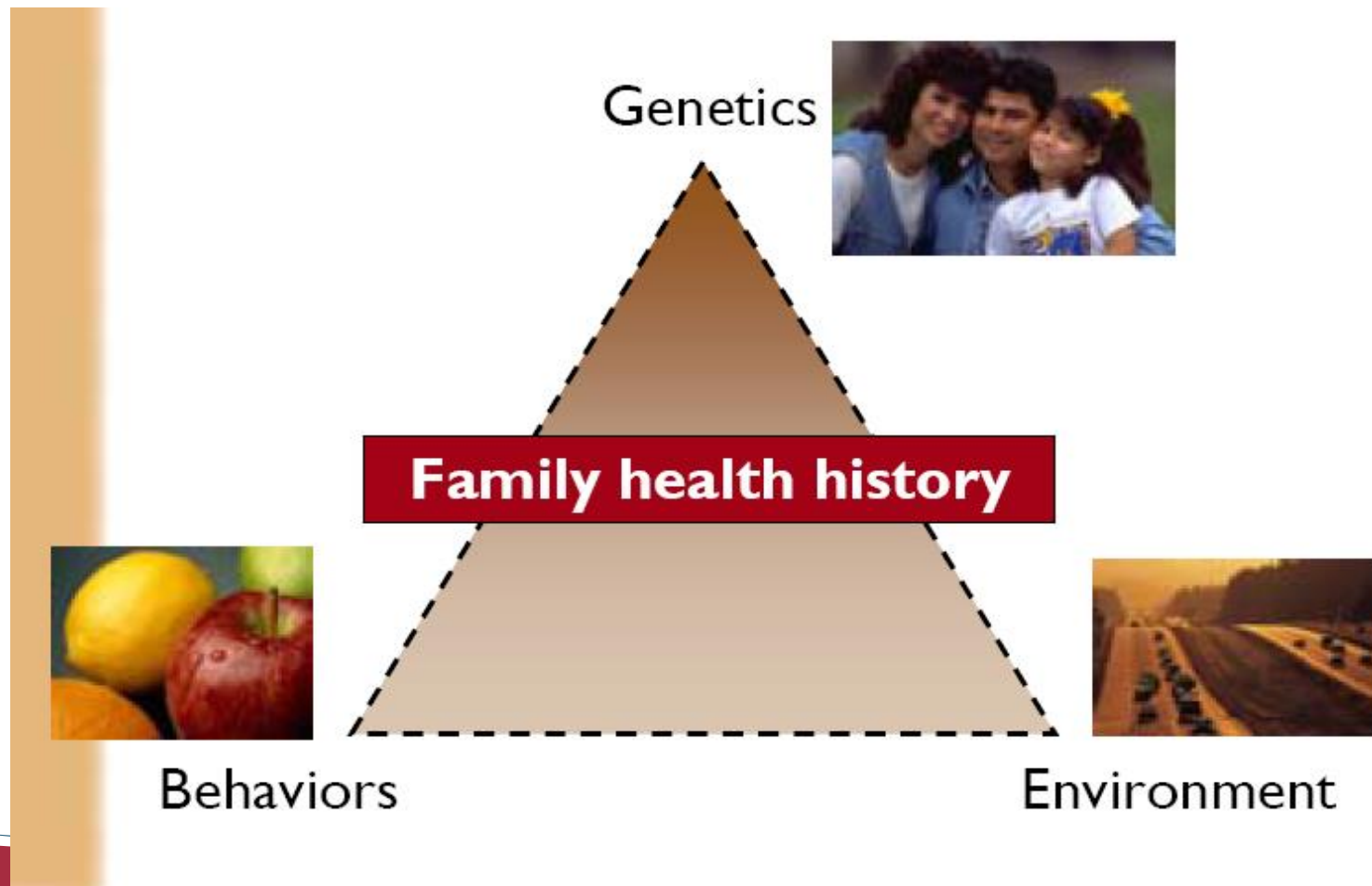
- ❖ Dietary score
- ❖ Exercise capacity
- ❖ Physical activity
- ❖ Metabolic syndrome
- ❖ Sitting time
- ❖ Stress/Hostility
- ❖ Gingivitis
- ❖ 2nd hand smoke
- ❖ E cigarettes/Marijuana
- ❖ RA, Lupus
- ❖ Marital satisfaction
- ❖ Commute distance
- ❖ Erectile dysfunction
- ❖ Pollution
- ❖ Mercury exposure
- ❖ Uric acid levels
- ❖ Poor sleep
 - Nighttime light exposure
- ❖ Loneliness
- ❖ Etc. etc. etc.

Risk Score – Modification(s)

- ❖ 10-year risk score is the **beginning of risk stratification, not the end**
- ❖ Key factors to consider
 - Family history
 - Coronary calcium, hs-CRP, ABI
 - Exercise, diet, lifestyle
 - Metabolic syndrome, pre-diabetes
 - Patient preference

Family History is Not Just Genetics

Genetics, Behaviors, Attitudes, Environments

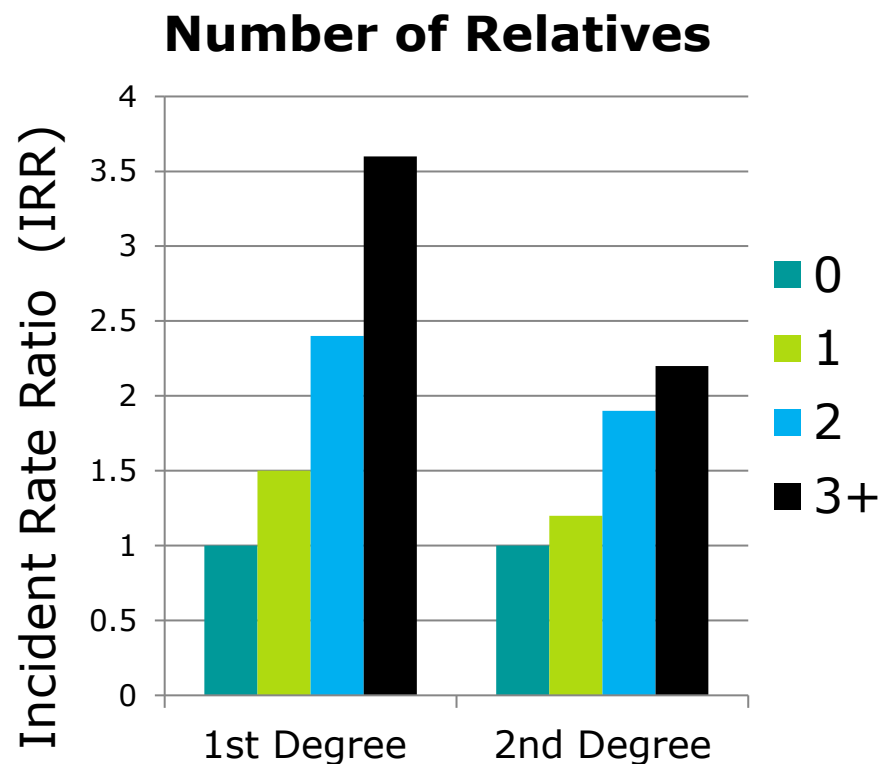


FH_x - Complex Risk Factor

- ❖ Family history is not bimodal
 - Continuous variable
 - Age 55 for men is an arbitrary cut-off
 - Age 65 for women is an arbitrary cut-off
- ❖ Number of 1st degree relatives affects risk
- ❖ Age of onset on first MI affects risk imparted to family members

Danish Registry

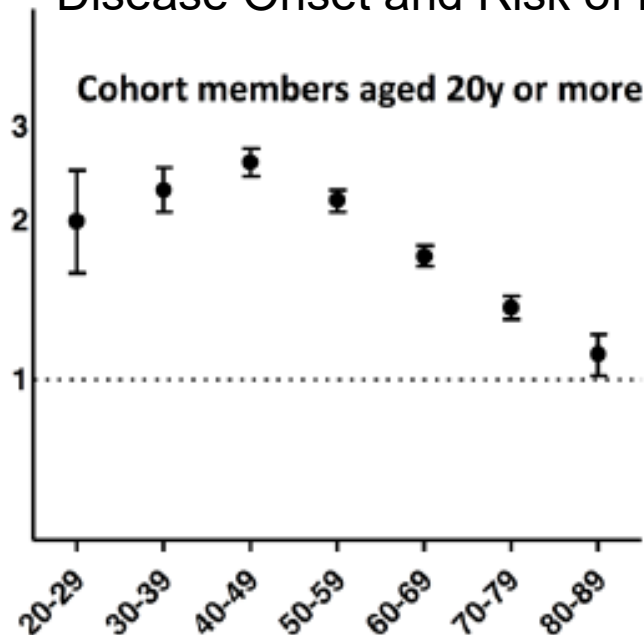
- ❖ Born between 1930-1992
- ❖ 4.4 Million people
- ❖ 104 Million years f/u
- ❖ Analysis by:
 - # of Relatives
 - Age of MI
 - Complexity



Ranthe et al, PLoS ONE, May 2015

Age and Complexity – Danish Registry

Family Member Age at
Disease Onset and Risk of MI



Number and Relationship of Family
Members and Risk of MI (pts age 36-55)

1 st Degree	2 nd Degree	IRR
0	0	1
0	1+	1.1
1	0	1.5
1	1	1.8
1	2+	2.5
2+	0	2.9
2+	1	3.7
2+	2+	7.5

Risk Enhancers

Risk Enhancers
History of premature ASCVD in a parent or sibling (onset age <55 y for men, <65 y for women)
Higher risk ancestry (eg, South Asian, Filipino)
High polygenic risk (if measured) (Section 4.2.3.5, "Polygenic Risk Scores")
Chronic inflammatory diseases (eg, systemic lupus, rheumatoid arthritis, advanced psoriasis, inflammatory arthritis)
Lp(a) ≥ 125 nmol/L or ≥ 50 mg/dL
hsCRP ≥ 2 mg/L on >1 occasion (if measured)
TG persistently ≥ 175 mg/dL (2 mmol/L) (if nonfasting) and ≥ 150 mg/dL (1.7 mmol/L) (if fasting)
CKM syndrome
LDL-C persistently ≥ 160 – 189 mg/dL (4.1–4.9 mmol/L), non-HDL-C ≥ 190 – 219 mg/dL or apoB ≥ 120 mg/dL*
Reproductive risk markers (premature menopause, preeclampsia, gestational diabetes, gestational hypertension, preterm delivery; Section 4.2.3.4, "Reproductive Risk Marker")

Risk “Reducers”

- ❖ High exercise capacity
- ❖ Mediterranean dietary pattern
- ❖ Family history of longevity
- ❖ No calcium on CT scans

Risk Prediction in Cardiovascular Medicine

Integrating Information From Novel Risk Factors With Calculated Risks

The Critical Impact of Risk Factor Prevalence

Albertus J. Kooter, MD; Piet J. Kostense, PhD; Jan Groenewold, PhD; Abel Thijs, MD;
Naveed Sattar, MD; Yvo M. Smulders, MD

- ❖ Must adjust for risk prevalence when using novel risk factors
- ❖ Risk calculator gets you most of the way
 - Cannot do more than adjust the base score by more than a factor of ~ 2 to 3 (either up or down)
 - Risk score 7% $\rightarrow$ 3 to 15%

CPR Framework for Risk Evaluation

LEGEND

- COR 1
- COR 2a
- COR 2b
- COR 3-No Benefit
- COR 3-Harm

(Class of Recommendation)

Calculate and Classify

Estimate 10-y risk with
PREVENT-ASCVD

1

Low risk
0%–<3%

Borderline risk
3%–<5%

Intermediate risk
5%–<10%

High risk
≥10%

Personalize

Discuss risk estimate
and therapy options
with patient

1

Discuss risk estimate
and therapy options
with patient

1

AND

Evaluate risk enhancers

2a

Discuss risk estimate
and therapy options
with patient

1

Discuss risk estimate
and therapy options
with patient

1

Reclassify and Reassess

If clinical or patient
uncertainty, consider
CAC score and revise
results

1

If clinical or patient
uncertainty, consider
CAC score and revise
results

1

Decide and Treat

Lifestyle modification

1

Treat with lifestyle
modification and
potential lipid-lowering
therapy

2a

Lifestyle modification
and lipid-lowering
therapy

1



2026 Dyslipidemia

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Diagnostic Testing for Risk Stratification

Guidelines for Imaging

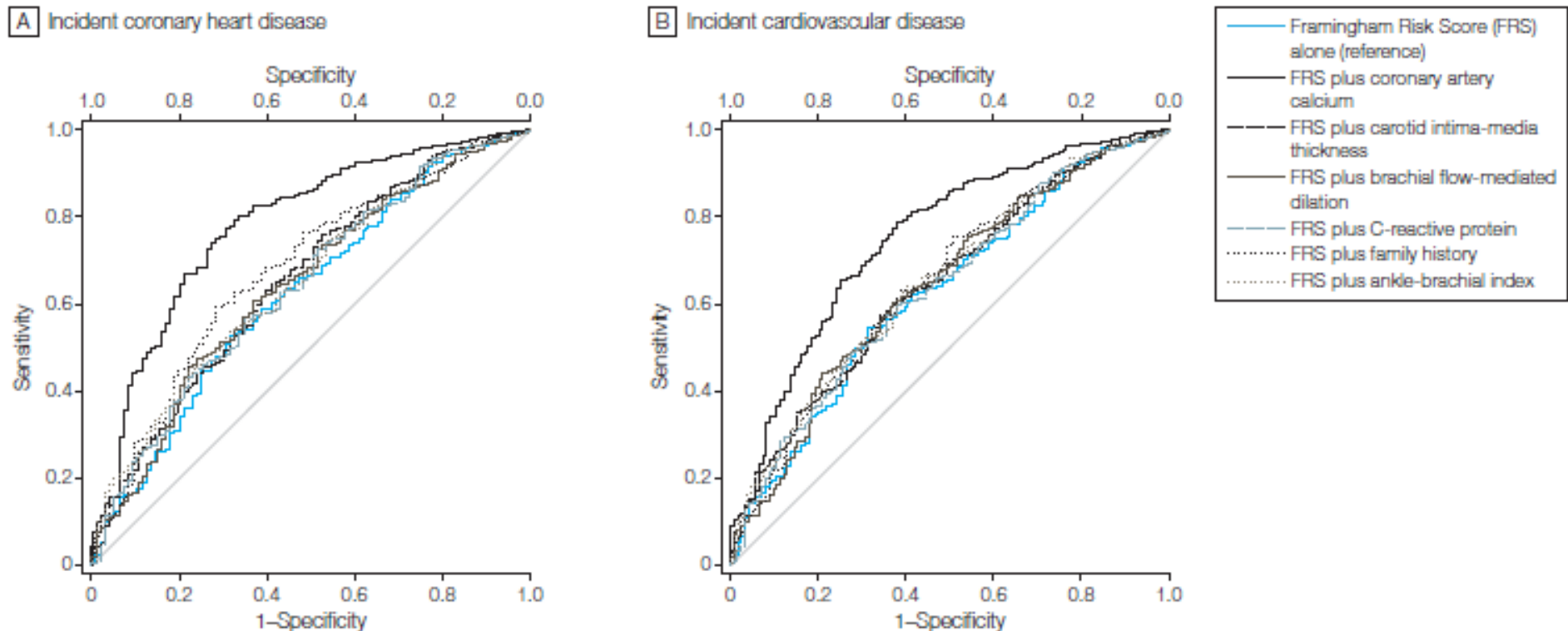
Recommendations for Selective Imaging of Subclinical Atherosclerosis (Men ≥ 40 or Women ≥ 45 Years)

Referenced studies that support recommendations are summarized in the [Evidence Table](#).

COR	LOE	Recommendations
1	B-R	1. In adults at intermediate risk and select adults at borderline risk with no prior ASCVD, if the decision regarding LLT remains uncertain, a CAC score should be used for further risk stratification and to guide the decision to withhold, postpone, or initiate therapy. ¹⁻⁴

Advanced Risk Stratification

Figure. Receiver Operator Characteristic Curves Showing Area Under the Curve for Incident Coronary Heart Disease and Incident Cardiovascular Disease in Intermediate-Risk MESA Participants



A, Receiver operator characteristic curves showing area under the curve for FRS alone, 0.623; FRS plus coronary artery calcium, 0.784 ($P < .001$); FRS plus intima-media thickness, 0.652 ($P = .01$); FRS plus flow-mediated dilation, 0.639 ($P = .06$); FRS plus high-sensitivity C-reactive protein, 0.640 ($P = .03$); FRS plus family history, 0.675 ($P = .001$); and FRS plus ankle-brachial index, 0.650 ($P = .01$). B, Receiver operator characteristic curves showing area under the curve for FRS alone, 0.623; FRS plus coronary artery calcium, 0.784 ($P < .001$); FRS plus intima-media thickness, 0.652 ($P = .01$); FRS plus flow-mediated dilation, 0.639 ($P = .06$); FRS plus high-sensitivity C-reactive protein, 0.640 ($P = .03$); FRS plus family history, 0.675 ($P = .001$); and FRS plus ankle-brachial index, 0.650 ($P = .01$).

http://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx



The Multi-Ethnic Study of Atherosclerosis

MESA 10-Year CHD Risk with Coronary Artery Calcification

[Back to CAC Tools](#)

Gender Male ☐ Female ☐
Age (45-85 years) Years
Coronary Artery Calcification Agatston

Race/Ethnicity

Choose One

Caucasian ☐
Chinese ☐
African American ☐
Hispanic ☐

Diabetes Yes ☐ No ☐
Currently Smoke Yes ☐ No ☐
Family History of Heart Attack Yes ☐ No ☐ History in parents, siblings, or children
Total Cholesterol mg/dL
HDL Cholesterol mg/dL
Systolic Blood Pressure mmHg
Lipid Lowering Medication Yes ☐ No ☐
Hypertension Medication Yes ☐ No ☐

Calculate 10-year CHD risk

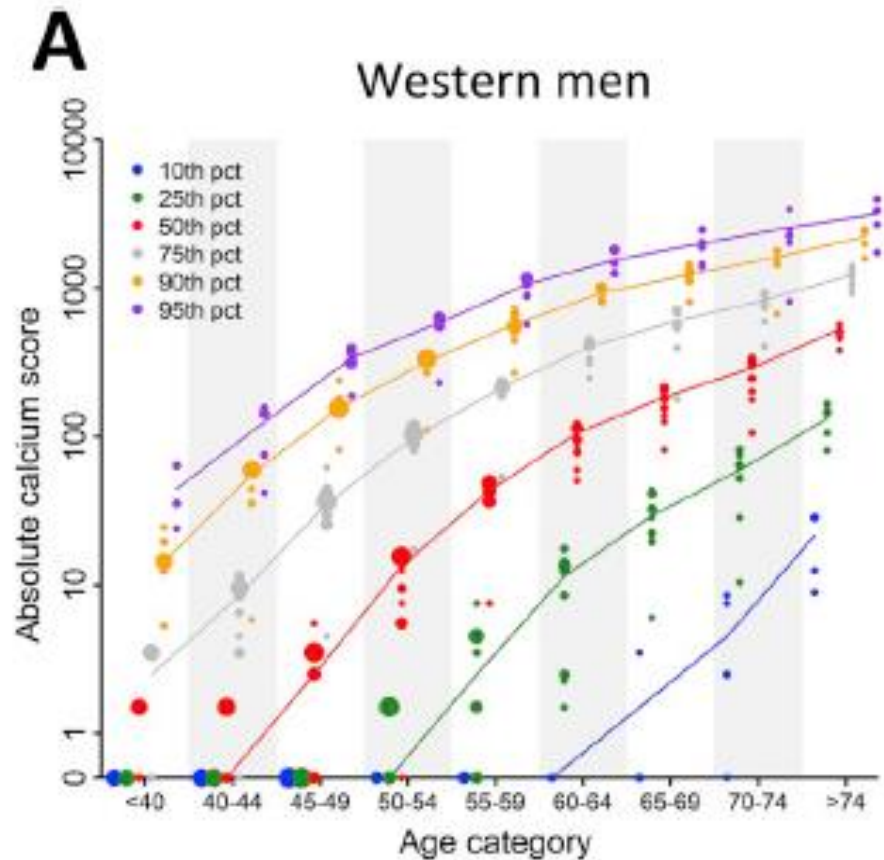
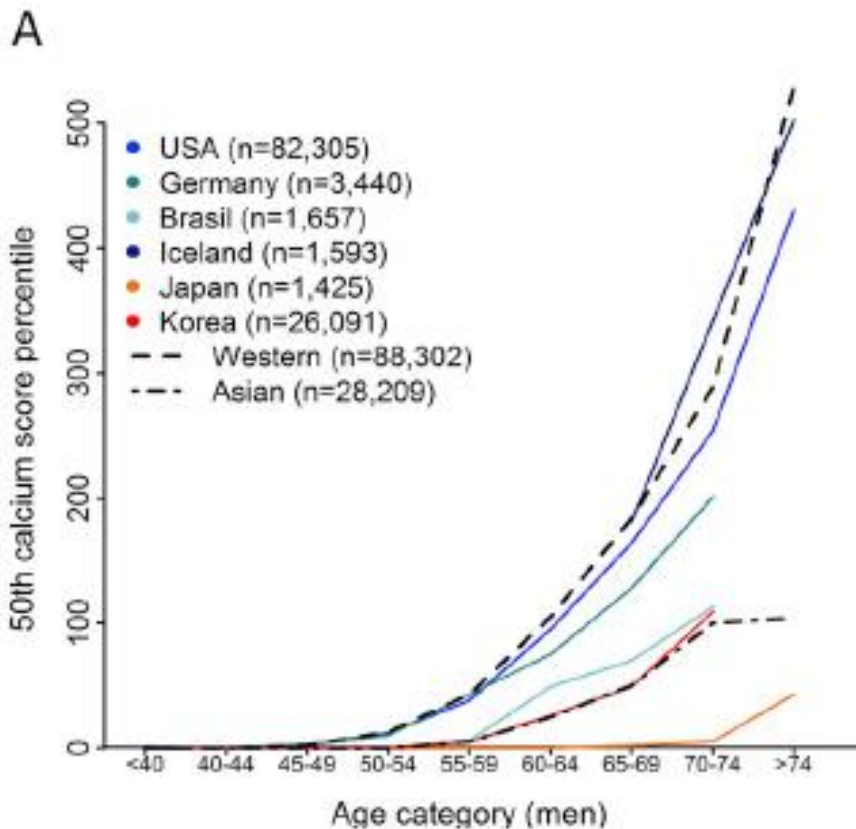
Coronary Artery Calcium

- ❖ Pathognomonic for atherosclerosis, correlates directly with the burden of atherosclerosis
- ❖ Available non-invasively, sometime for free
- ❖ Simple (10 minutes)
- ❖ Inexpensive (about \$150 OOP)
- ❖ Can risk-stratify patients
 - High-risk (needs treatment)
 - Low-risk (does not need treatment)

A pooled-analysis of age and sex based coronary artery calcium scores percentiles



Maurice W.J. de Ronde^{a,b}, Amir Khoshiwal^{a,b}, R. Nils Planken^c, S. Matthijs Boekholdt^d, Mariette Biemond^{a,b}, Matthew J. Budoff^e, Bruce Cooil^f, Paulo A. Lotufo^g, Isabela M. Bensenor^g,



Risk of Death

- ❖ Cohort of 10,377 asymptomatic
- ❖ 5 years follow-up. Had Framingham risk

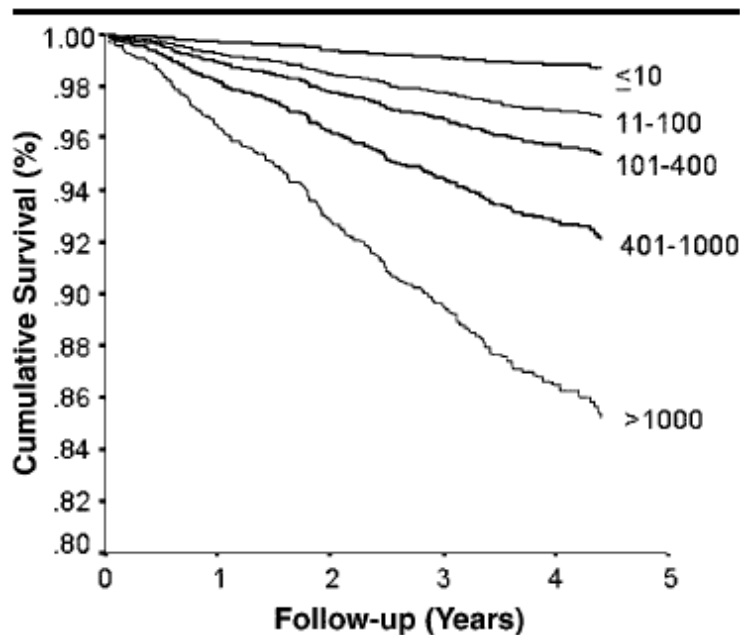


Figure 1. Graph shows unadjusted all-cause survival according to calcium score subsets. Survival rate is proportionally worse as the baseline calcium score increases.

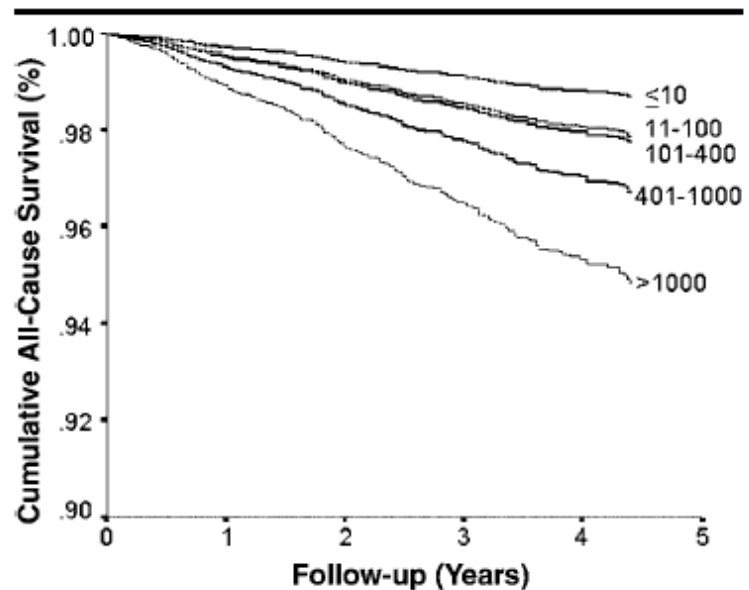


Figure 2. Graph shows risk-adjusted all-cause survival estimates according to calcium score subsets. Even after adjustment, survival rate is proportionally worse as the baseline calcium score increases.

Death at 5 years by CAC

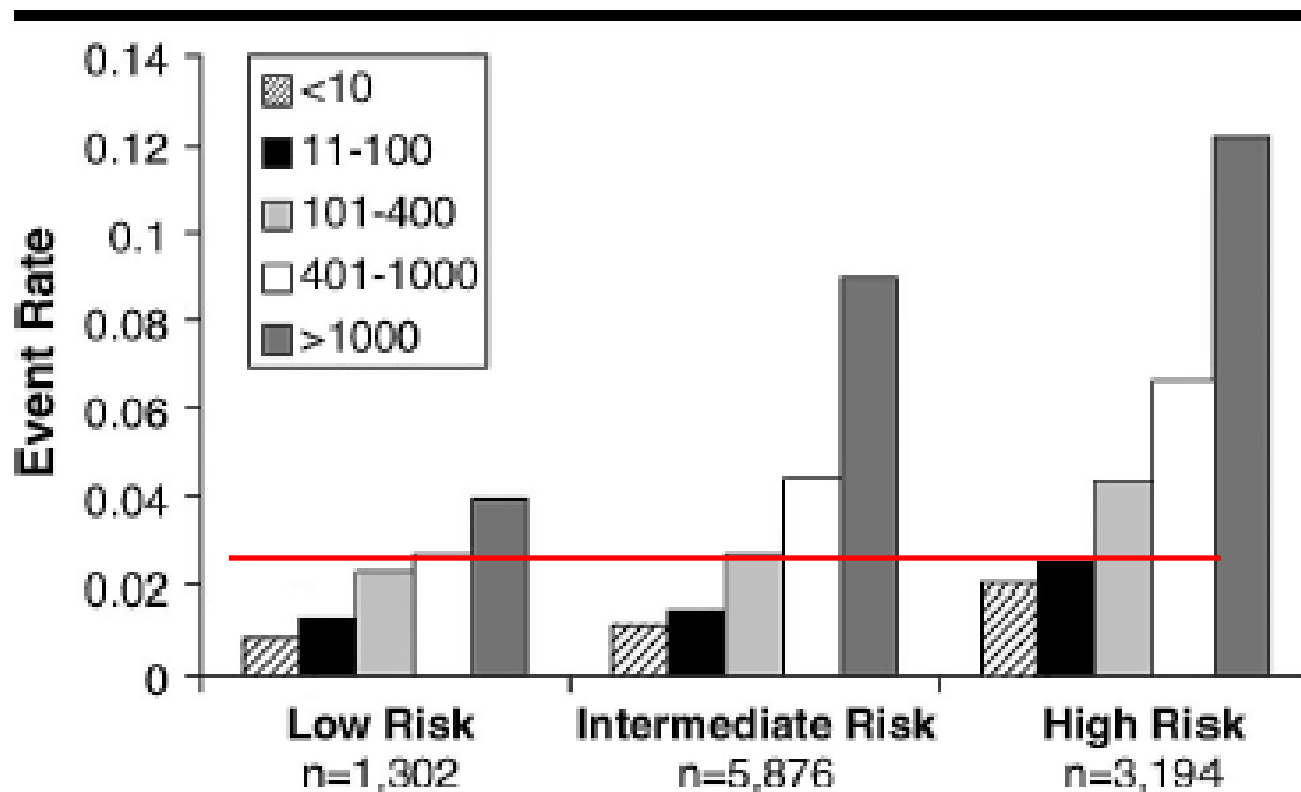


Figure 4. Graph shows risk stratification for each category of Framingham risk (from low to high) according to baseline calcium score. Event rate is predicted mortality at 5 years.

Guidelines

1	B-NR
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3. In adults at intermediate risk and select adults at borderline risk, if the CAC score is >0 AU, it is recommended to initiate LLT, particularly if the CAC score is ≥ 100 AU or ≥ 75 th standardized percentile to reduce ASCVD risk.⁵

CAC is categorized:

- Absent (0)
- Minimal (1-9)
- Mild (10-99)
- Moderate (100-299)
- Severe (300-999)
- Extensive (≥ 1000)

CAC Score and Rx

- ❖ Calcium 0 = 10 years of disease-free living
 - Typically repeat in 5 years
- ❖ CAC= 300
 - Aspirin
 - High Intensity Statin
 - Secondary prevention goals, LDL <55
- ❖ CAC > 1000
 - Stress test still not needed, but controversial

CAC and Health Behavior

- ❖ 510 patients with CAC score
- ❖ 6 year follow-up survey for health behaviors
- ❖ **Shown** pictures of calcium

Schwartz et al, J Behav Med 2011 (34):148

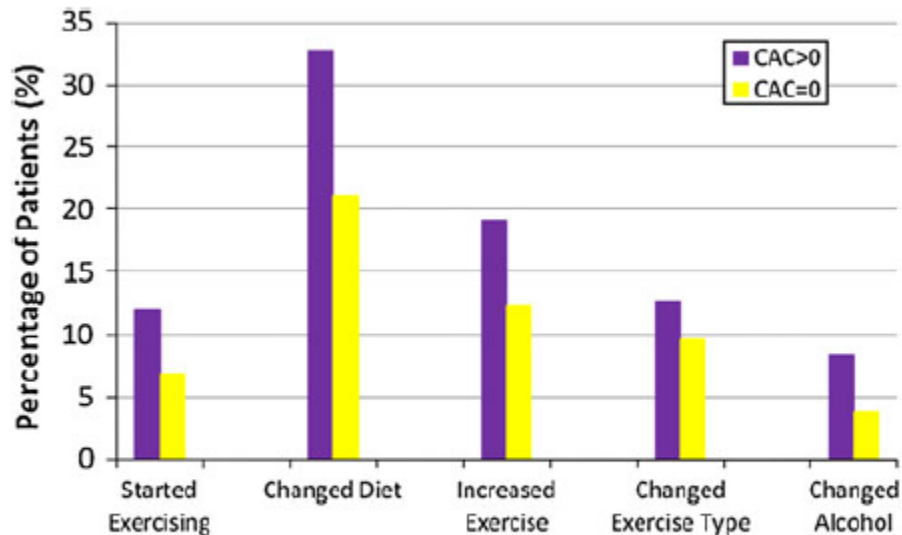


Fig. 1 Percentage of patients who changed health behaviours, according to presence or absence of CAC

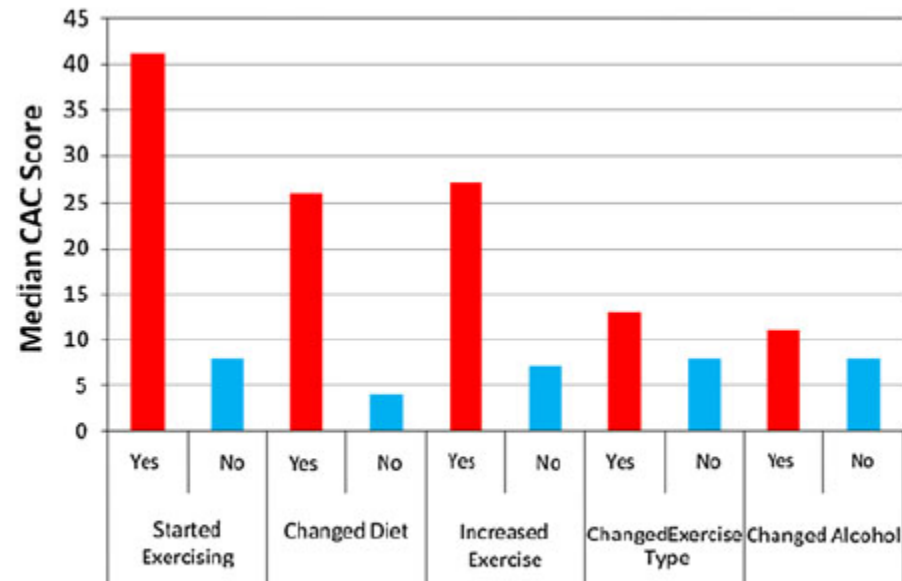


Fig. 2 Median coronary artery calcium score by health behaviour

CAC and Behavior Change 2

- ❖ 980 patients
- ❖ CAC
- ❖ 3 year later
- ❖ Assessed Behavior Change

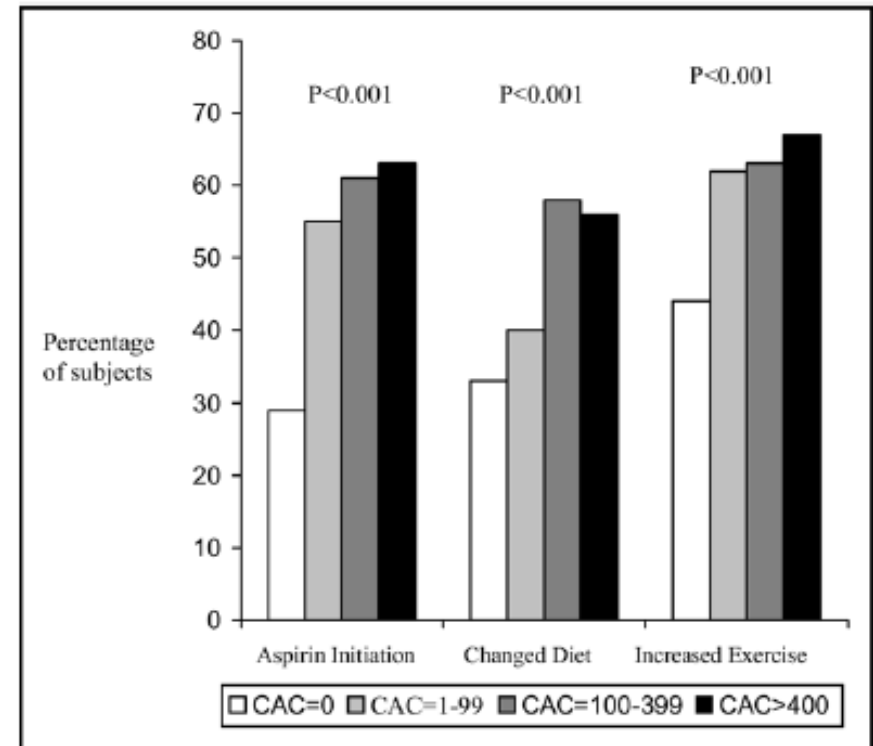


Figure 1. Percentage of subjects with ASA initiation, dietary changes, and increased exercise, according to CAC scores.

Orakzai et al, Am J Cards 2008; 101:999-1002

Case Scenario #1, 2012

- ❖ 63 yo man, asymptomatic, Caucasian
- ❖ Hyperlipidemia, on rosuvastatin
- ❖ No family history of early CHD
- ❖ Regular cigar user
- ❖ BP is 128/86
- ❖ Total Cholesterol 189, HDL 41, LDL 117
- ❖ Not interested in exercise or quitting cigar use

Questions

- ❖ Does this man have obstructive coronary artery disease?
- ❖ What is his risk of a major coronary event in the next 10 years?

Case Conclusions

- ❖ 10-year ACC/AHA risk: 12.2%
- ❖ Patient underwent CAC screening



http://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx



The Multi-Ethnic Study of Atherosclerosis

MESA 10-Year CHD Risk with Coronary Artery Calcification

[Back to CAC Tools](#)

Gender

Male ☐

Female ☐

Age (45-85 years)

Years

Coronary Artery Calcification

Agatston

Race/Ethnicity

Choose One

Caucasian

☐

Chinese

☐

African American

☐

Hispanic

☐

Diabetes

Yes ☐

No ☐

Currently Smoke

Yes ☐

No ☐

Family History of Heart Attack

Yes ☐

No ☐

History in parents, siblings, or children

Total Cholesterol

mg/dL

HDL Cholesterol

mg/dL

Systolic Blood Pressure

mmHg

Lipid Lowering Medication

Yes ☐

No ☐

Hypertension Medication

Yes ☐

No ☐

Calculate 10-year CHD risk

ogram

CAC

❖ Total Score: 1382
(96th)

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 25.2%. 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 12.2%.

Follow-up Appointment

- ❖ We strongly encouraged statin adherence (LDL goal <70) quitting cigars, and lifestyle change!
- ❖ Patient was surprised, willing to quit cigars, increase statin dose

Case #2, June 2021

- ❖ CC: Severe hyperlipidemia
- ❖ HPI: 55 yo man, no symptoms
 - Exercises regularly, 1 hr per day
 - Simvastatin 10 mg for 3 years
 - myalgias, “brain fog”
- ❖ PMH:
 - Erectile Dysfunction
 - Hyperlipidemia
 - No smoking, no diabetes
- ❖ Meds: Tylenol - PRN, MVI, Vit D

MRN:1791647

Family History, Exam, Labs

❖ Family History

- Mom – alive, well, age 85
- Father – alive, well, age 88
- Longevity in uncles, siblings
- Some DM, no CAD, No vascular disease

❖ Exam; 135/65. Wt is 181, BMI 26

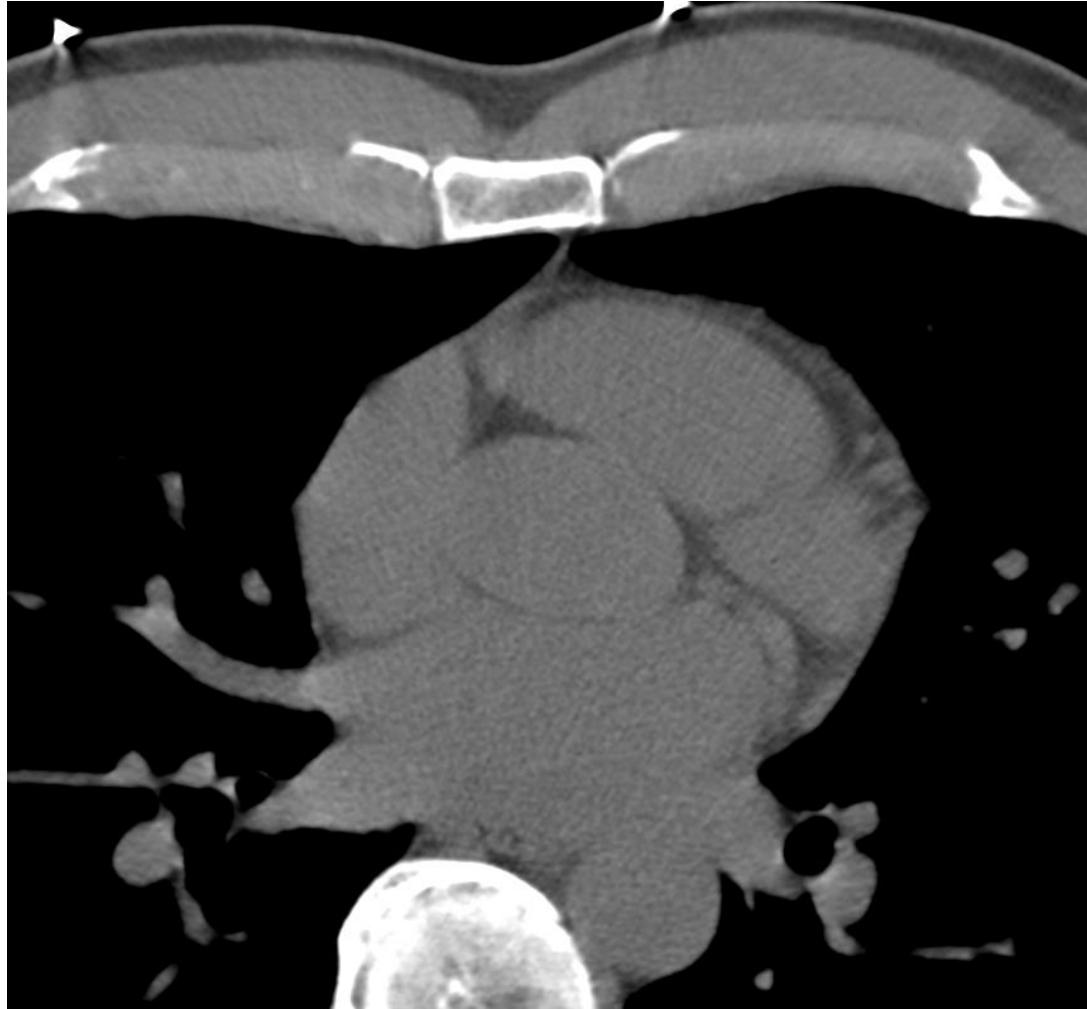
❖ No xanthomas, no corneal arcus

❖ TC: 296, TG: 82, HDL:73, LDL:207

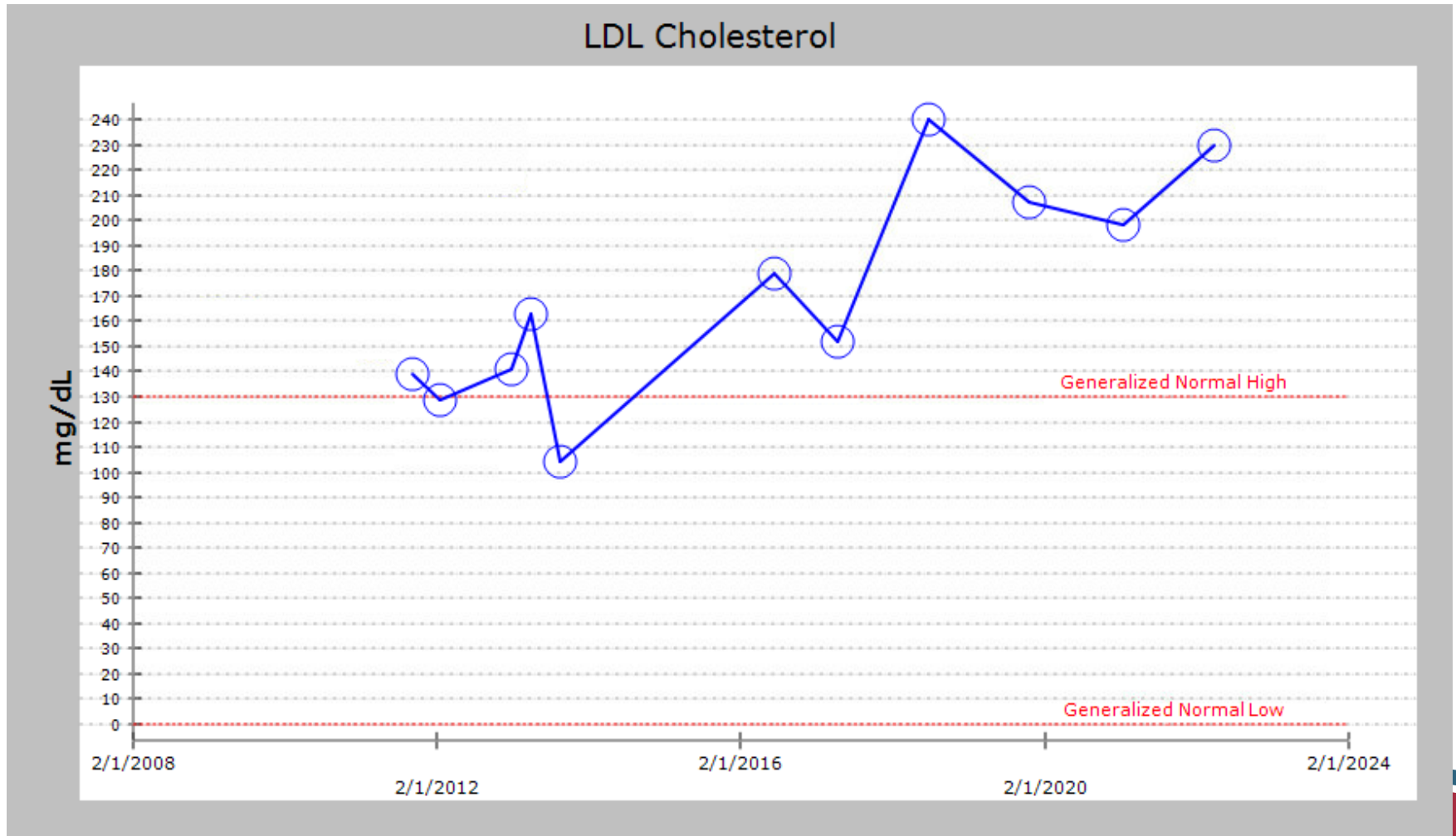
❖ EKG normal, Echo normal

❖ Next steps?

Calcium Score = 0



LDL – Trends over Time



Risk Re-stratification

- ❖ Does not have Familial Hypercholesterolemia
- ❖ NHLBI MESA without calcium: 4%
- ❖ NHLBI MESA with calcium: 2%
- ❖ ApoB: 146, lower than expected for LDL level
- ❖ Adjusted risk: ~1.5%
 - Family history of longevity
 - Exercise

Rest of the Story

❖ More History:

- Patient had been on a keto-diet for 5 years
- Lost 45 pounds, gained muscle

❖ Patient declined statin

❖ Repeat CAC in 5 years

- Has not been back (currently due)

Case #3 – Oct 2024

- ❖ 39 yo man with chest pain x 4 weeks
 - Substernal pressure, intermittent, heaviness
 - Radiates to throat,
 - Stressed at home
 - Physically active, no CP or SOB
- ❖ PMH: Hyperlipidemia
- ❖ Atorvastatin 10 mg
- ❖ No tobacco, no diabetes

FamHx, Exam, Tests

- ❖ Lipids: TC 262, TG 385, HDL 43, LDL 142
- ❖ Family History
 - Grandfather – MI (death) at 55, DMII
 - Father: HLD, HTN
 - Mother: Thyroid Dis
- ❖ Exam
 - BP 155/92, HR 65, BMI 29
 - Rest of exam unremarkable
- ❖ EKG is normal
- ❖ Treadmill stress in 2021 was normal

Assessment

- ❖ Likely GI in etiology
 - Trial of PPI
- ❖ Given family history
 - CT Heart W/O Dye Quan Eval

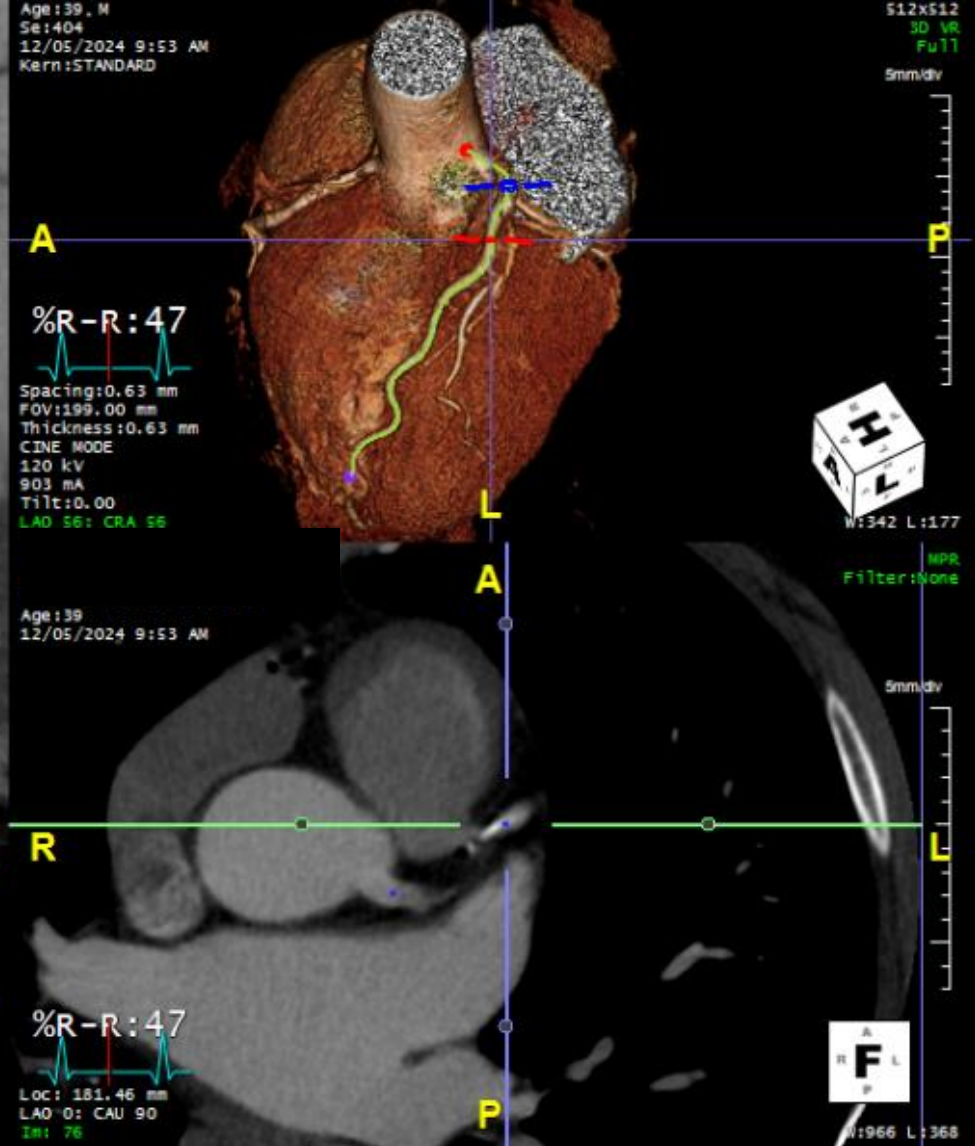
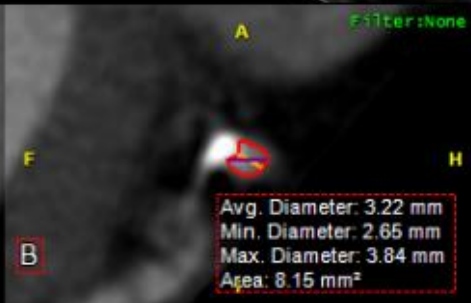
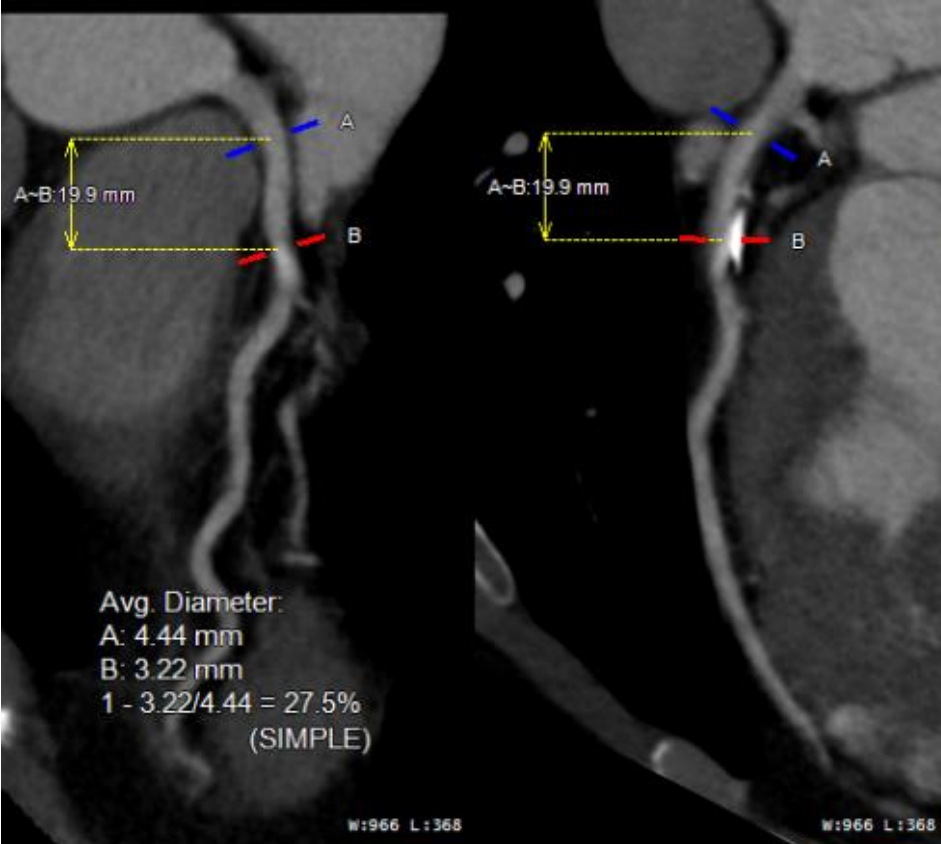
Calcium Score

- ❖ Coronary Calcium Scoring Summary:
- ❖ Left Main: Score 0.
- ❖ LAD: Score 127.
- ❖ Circumflex: Score 0.
- ❖ Right: Score 72.6.
- ❖ TOTAL: Score 200
- ❖ The Agatston coronary calcium score is 200.
- ❖ The observed calcium score is at the 99th percentile
- ❖ "Mild CAC"



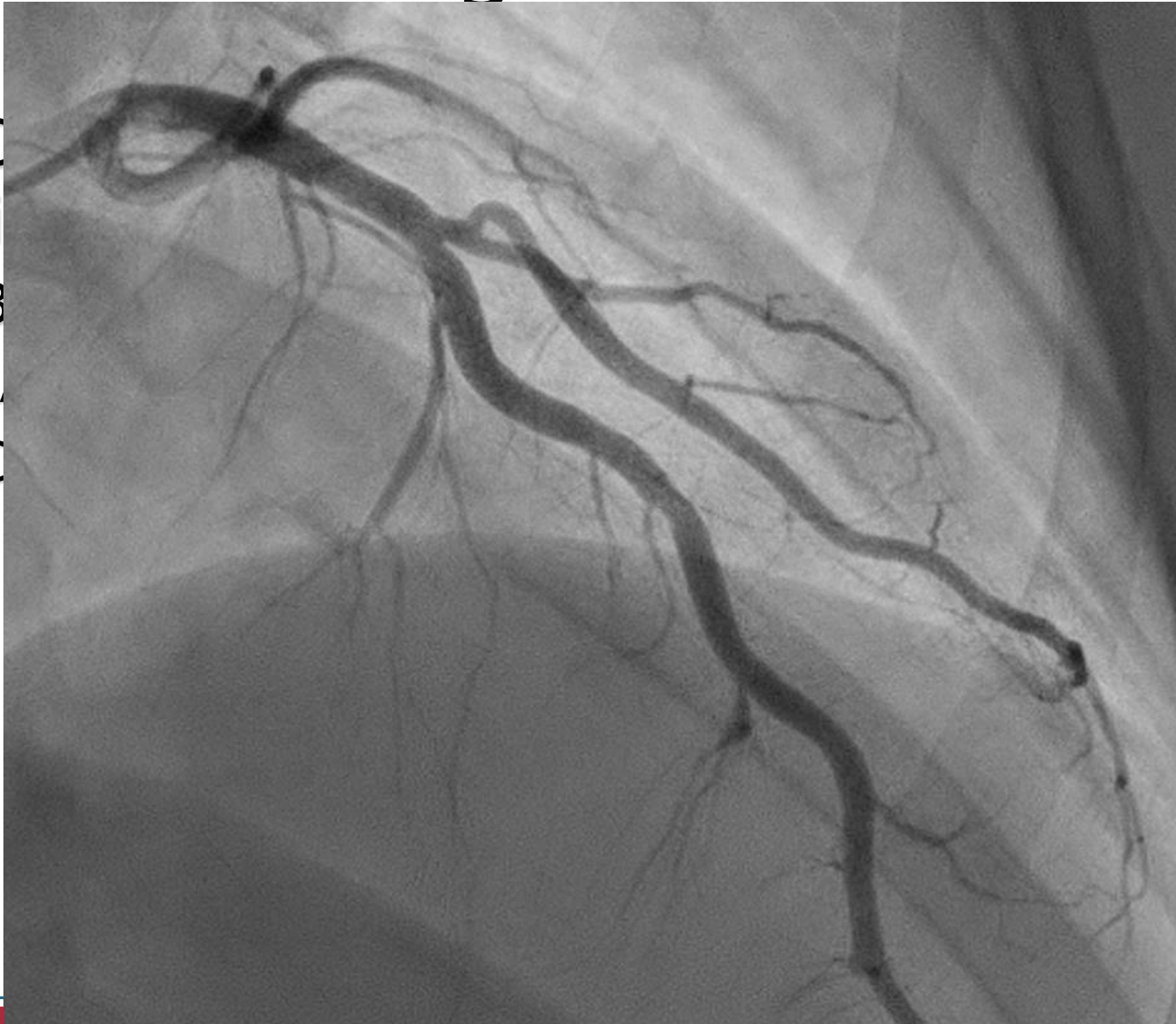
More Chest Pain

- ❖ Seen in ER shortly after results
- ❖ Cardiology saw patient
 - Evaluation negative (EKG normal, Trop -neg)
- ❖ CT-Angiogram



Management

- ❖ CT C
- Angi
- D3
- pL
- RO



%

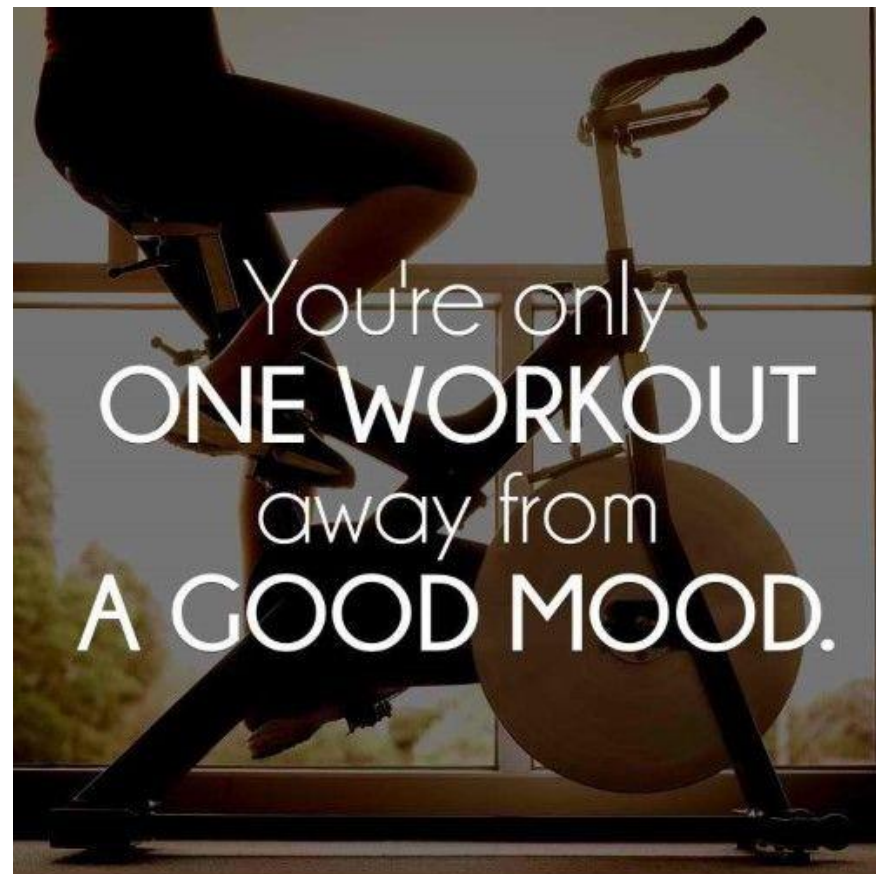
Cardiology f/u

- ❖ “Hyperlipidemia-improved but still not at goal. Primary prevention LDL less than 100 would be the goal. He continues to be compliant with atorvastatin 40 mg daily and lifestyle modifications.”
- ❖ Medications:
 - Atorvastatin 40 mg
 - Ezetimibe 10 mg
 - Nitro (SL), Fish Oil, MVA, Vit D
- ❖ 4/16/26
 - Lipids: TC 147; TG 147, HDL 44, LDL 81
 - Lp(a) 11.1, Apo B 101

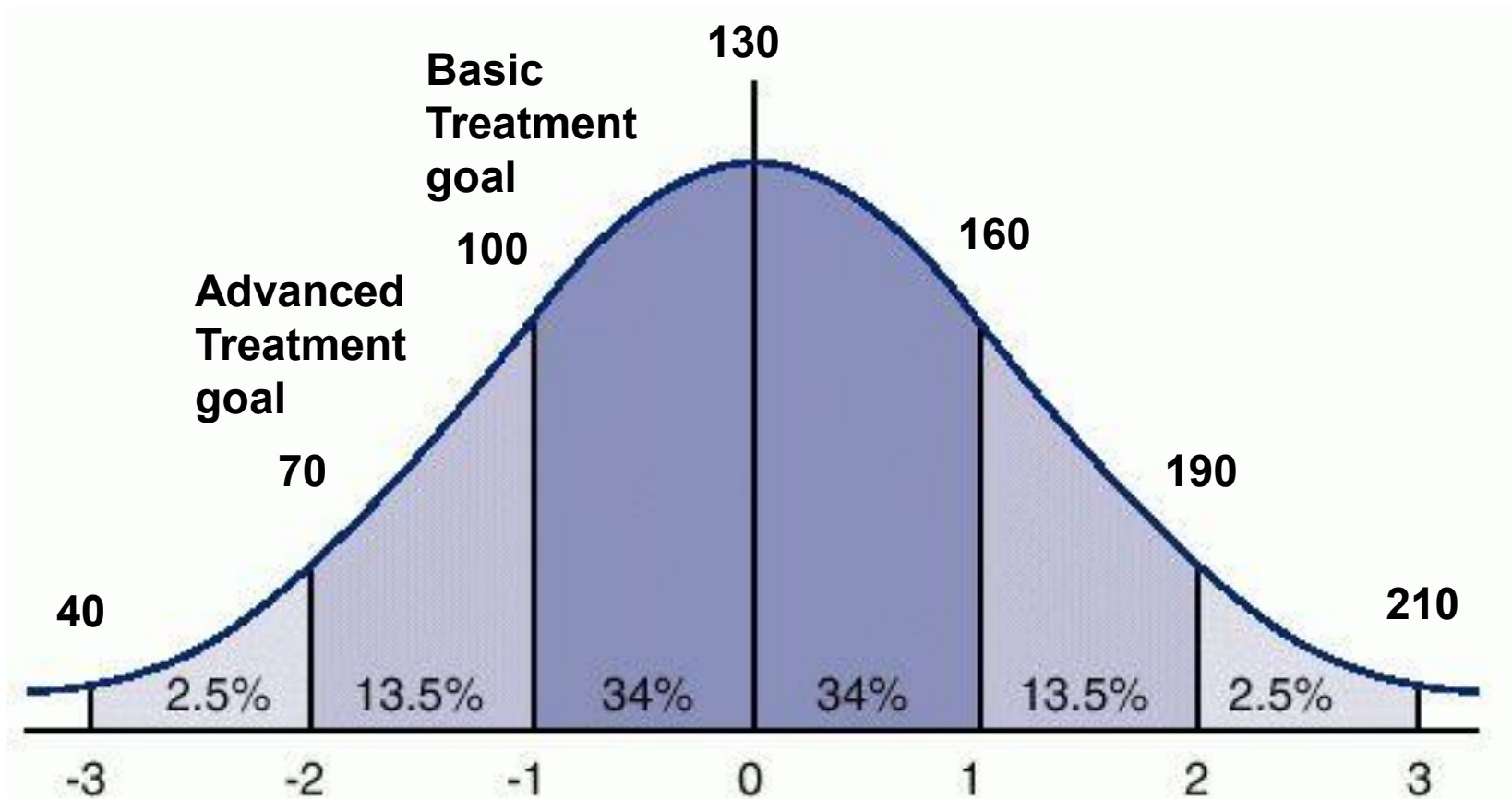
Questions?

Quinn.PackMD@baystatehealth.org

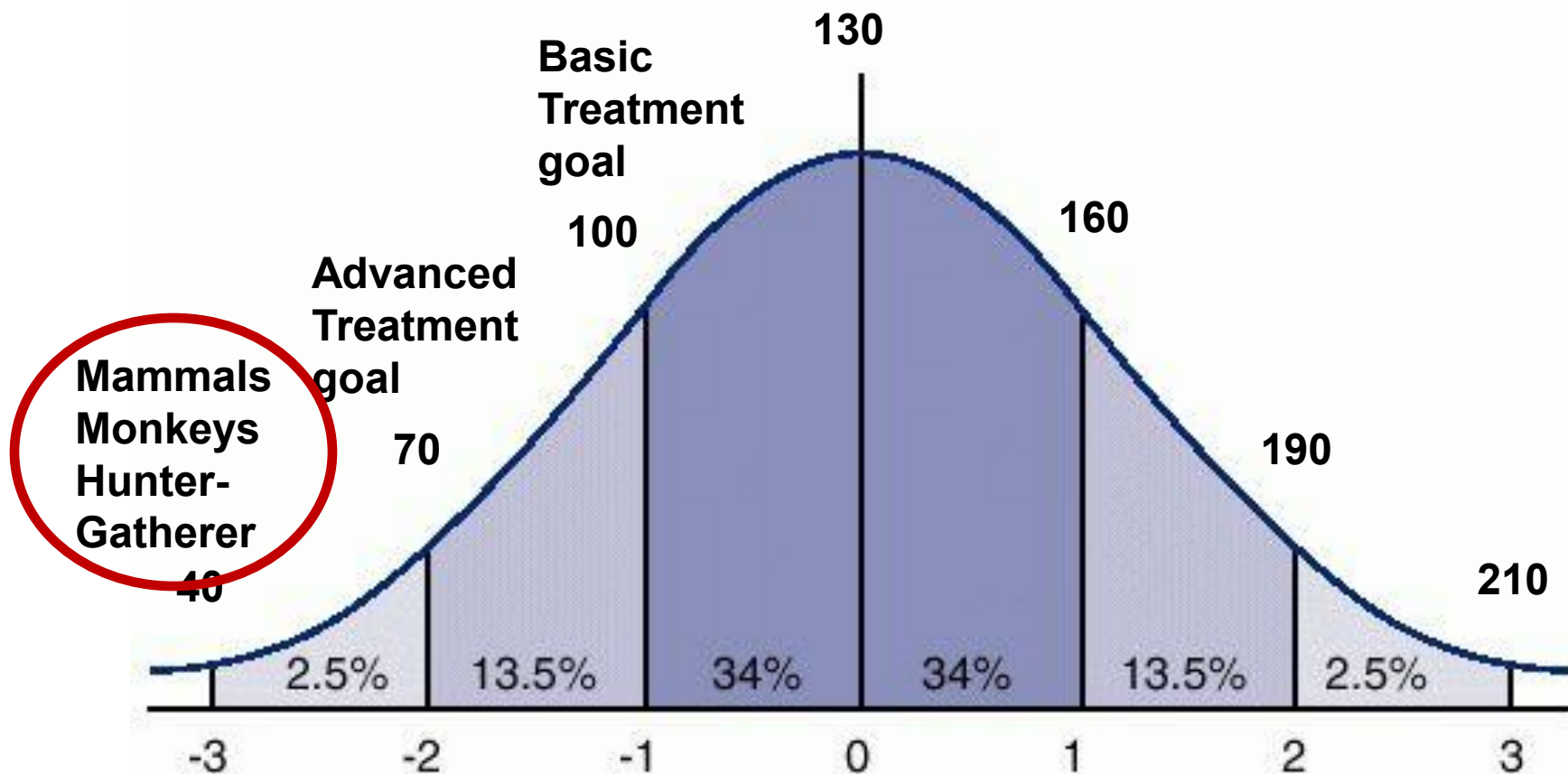
Favorite Quotes



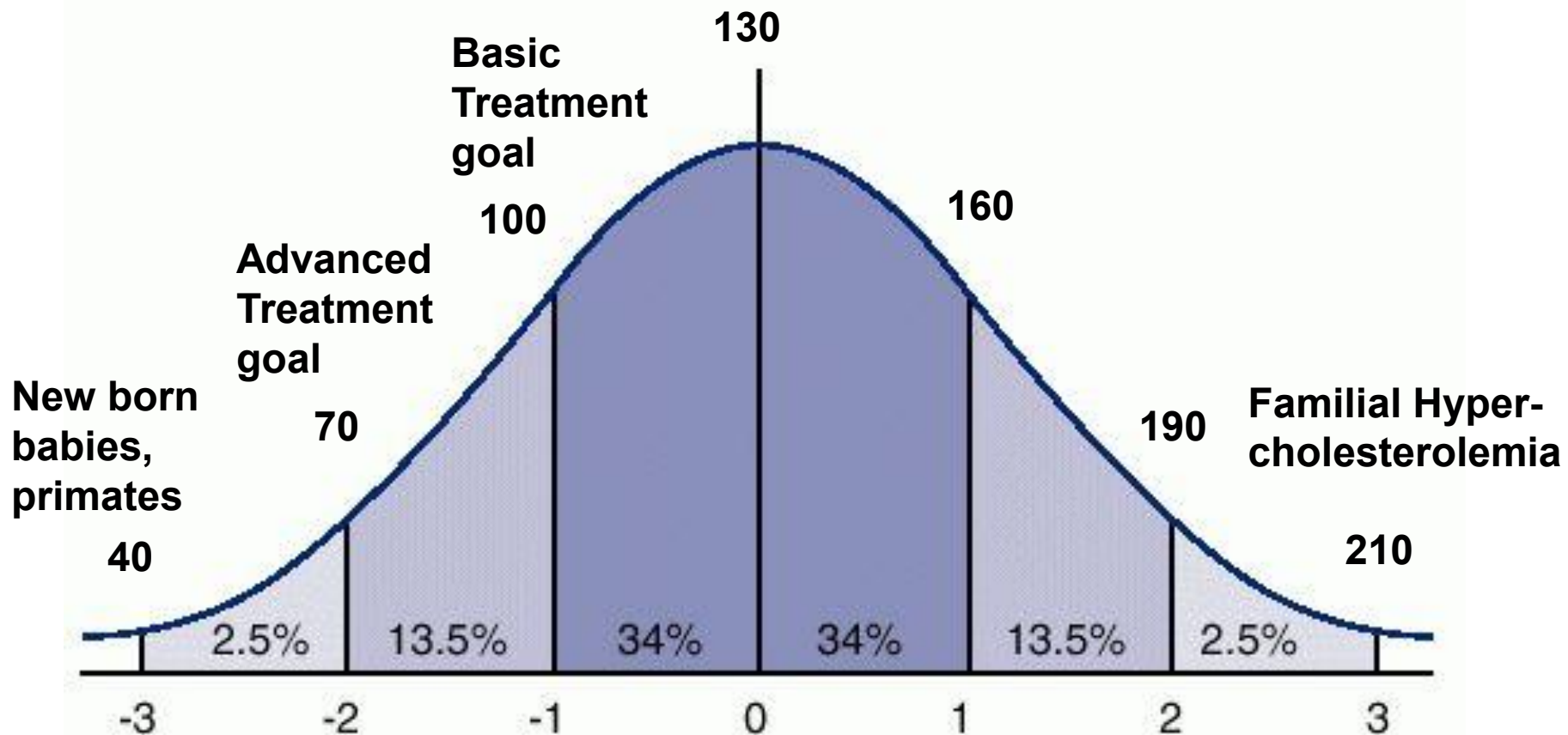
LDL Cholesterol, Mean $\pm$ SD US Population Average



Physiologic Normal LDL Cholesterol



Familial Hypercholesterolemia



Costs

- ❖ Statin – generic
 - ❖ Ezetimibe - generic
 - ❖ Alirocumab/Evolocumab - \$5850/year
 - ❖ Inclisiran – \$3,373 per dose
 - ❖ Bempedoic Acid - \$405/month – \$4860/yr.
 - ❖ Icosapent Ethyl - \$5400/yr
-
- ❖ When LDL<100, some caution about price is indicated

Baystate Cardiology Lipid Clinic

- ❖ 3300 Main Street, Tolosky Center
- ❖ Tuesdays 8 AM to 4 PM
- ❖ New patient visit, in person, 60 minutes
 - Detailed history of failed therapies and side effects, med rec
 - Education on plaque pathogenesis and cardiovascular risk
 - Education on low cholesterol diets and benefits of exercise
 - Formulate a mutually agreed upon plan for lowering LDL
 - Initiate therapy
- ❖ Return Visit every 5 to 8 weeks, in person, 20 to 30 minutes
 - Discuss side effects/tolerance
 - Discuss recent lipid panel results
 - Patients are seen until LDL goal is achieved

Lipid Clinic Referral Pathway

- ❖ Send a CIS message:
 - To: Cardiology-Admin
 - cc: Simonich PharmD, Nicholas and Pack MD, Quinn

- ❖ Please indicate that you wish to refer the pt to the Lipid Clinic
 - List failed therapies
 - LDL goal <100, <70, or <55
 - Primary or secondary prevention