Brigham and Women's Hospital
Founding Member, Mass General Brigham

PREVENTION OF CARDIOVASCULAR DISEASE

Brendan M. Everett, MD, MPH
Associate Physician, Brigham and Women's Hospital
Divisions of Cardiovascular Medicine and Preventive Medicine
Brigham and Women's Hospital
Associate Professor
Harvard Medical School

Brendan M. Everett, MD, MPH

- Harvard Medical School
- Medicine Residency at MGH
- Cardiovascular Medicine Fellowship at MGH
- Harvard School of Public Health (MPH)
- Associate Professor of Medicine HMS
  - Clinical focus: preventive cardiology, lipids, valvular heart disease
  - Research focus: inflammation, diabetes and cardiovascular disease

Disclosures

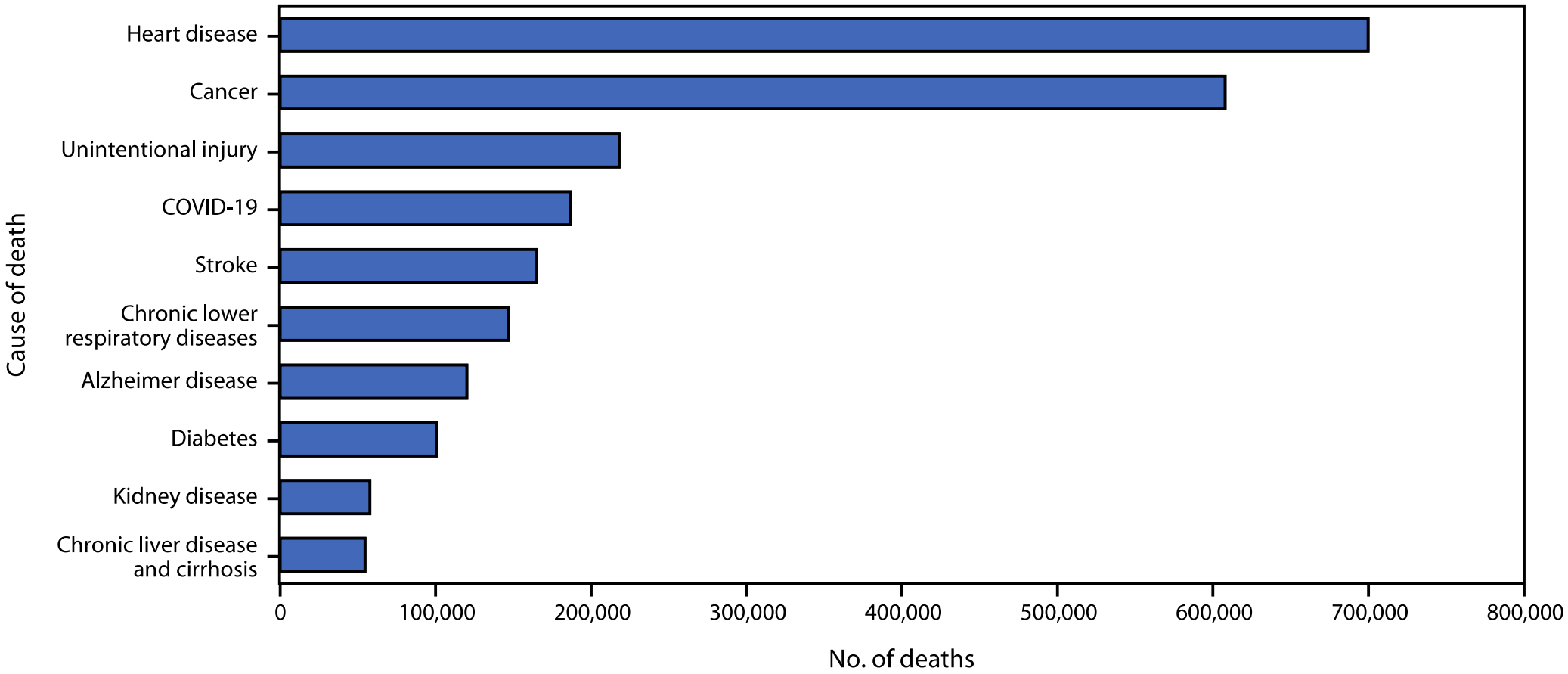
- Consulting or Investigator Initiated Grants from
  - PCORI
  - Novo Nordisk
  - Eli Lilly and Company
  - Kowa
  - Circulation
  - Up to Date
  - FDA
  - NIDDK

Cardiovascular Disease Prevention: Key Learning Objectives

- Describe the prevalence of cardiovascular disease (CVD) in the US and around the world
- Identify CVD risk factors and behaviors
- Understand the evidence base that supports recommendations for CVD prevention, including for
  - Diet
  - Exercise
  - Smoking cessation
  - Blood pressure control
  - Risk estimation and prediction
  - Lipid lowering therapy
  - Use (or non-use) of aspirin

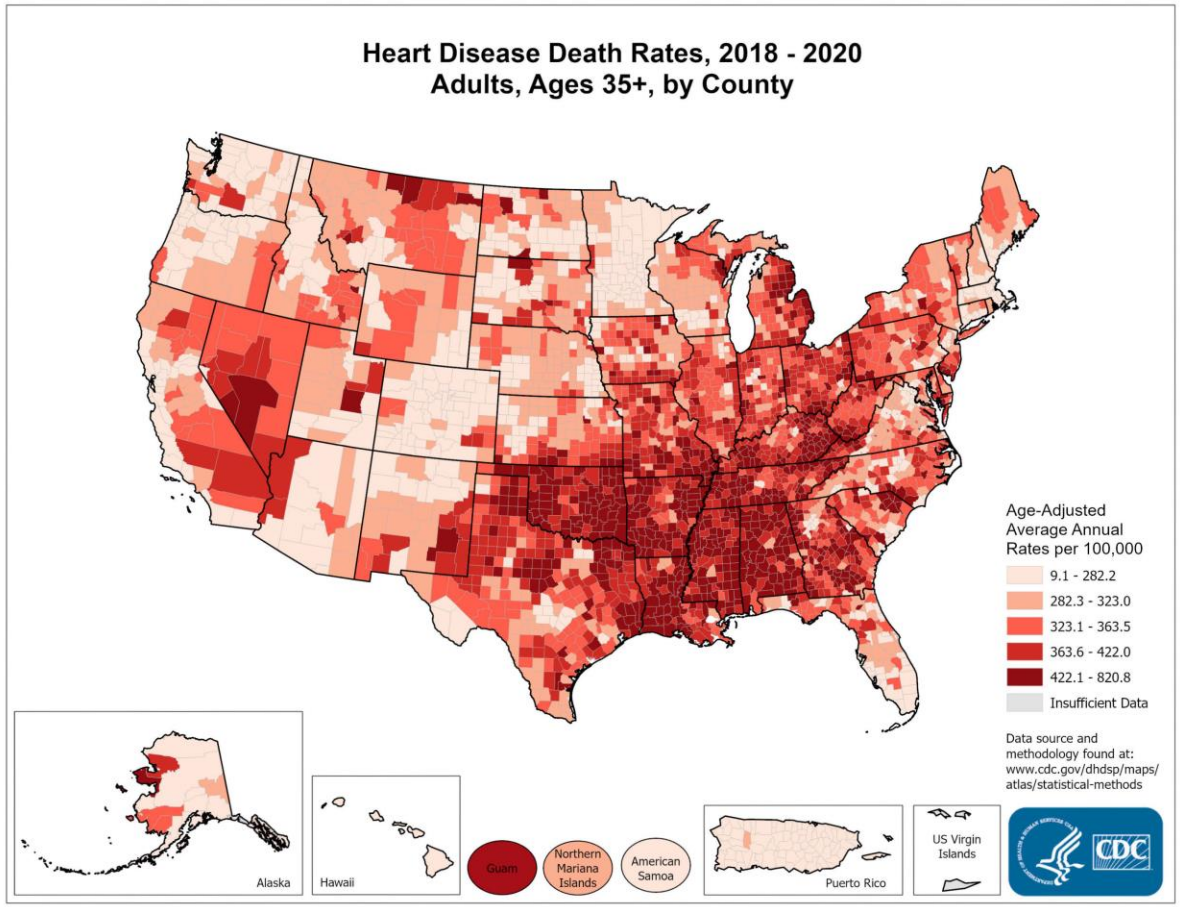
Provisional Mortality Data in the United States in 2022

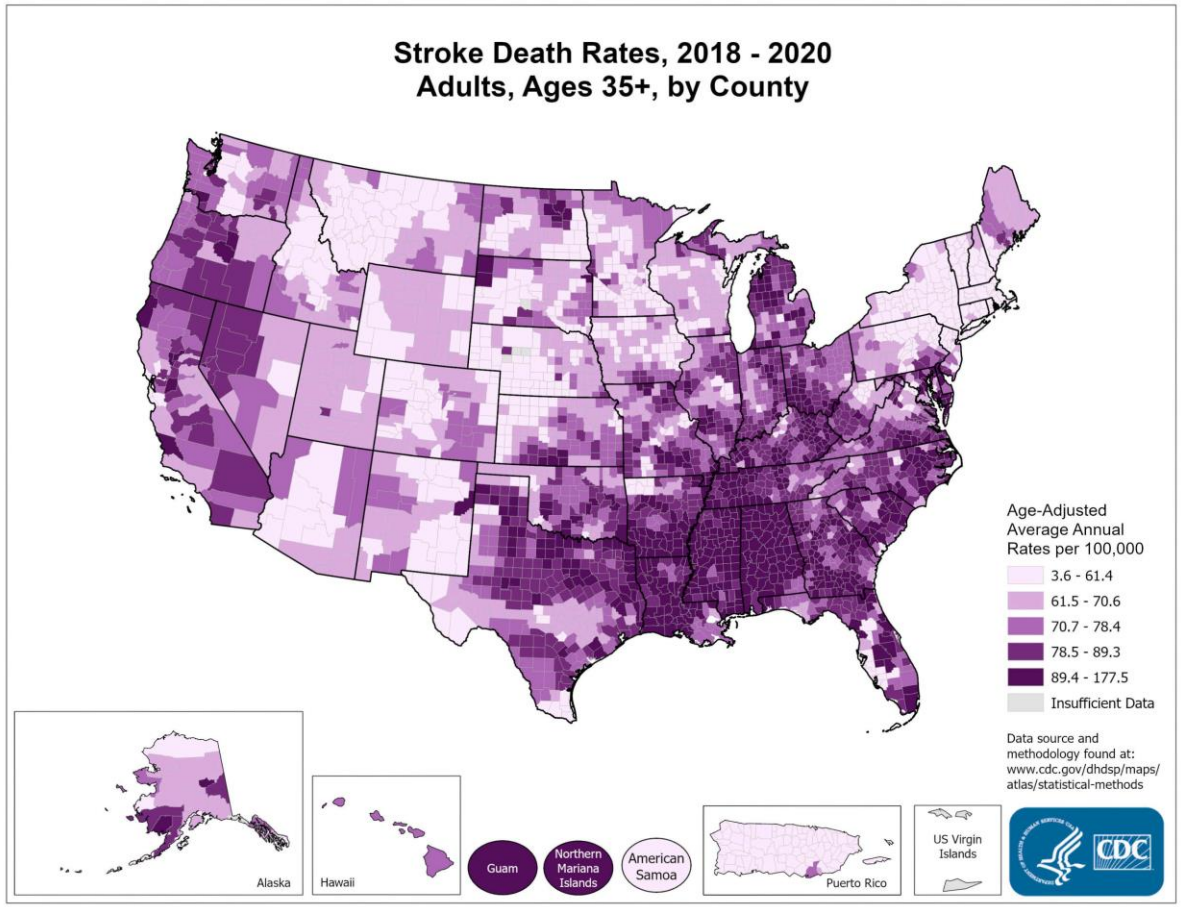
FIGURE 2. Leading underlying causes of death*,† — National Vital Statistics System, United States, 2022



Ahmad et al. MMWR / May 5, 2023 / Vol. 72 / No. 18

Deaths due to Heart Disease and Stroke





Source: CDC.gov https://www.cdc.gov/dhdsp/maps/pdfs/hd_all.pdf,
https://www.cdc.gov/dhdsp/maps/pdfs/stroke_all.pdf

Age-Standardized Disability Adjusted Life Year Rates (per 100,000) in 2019

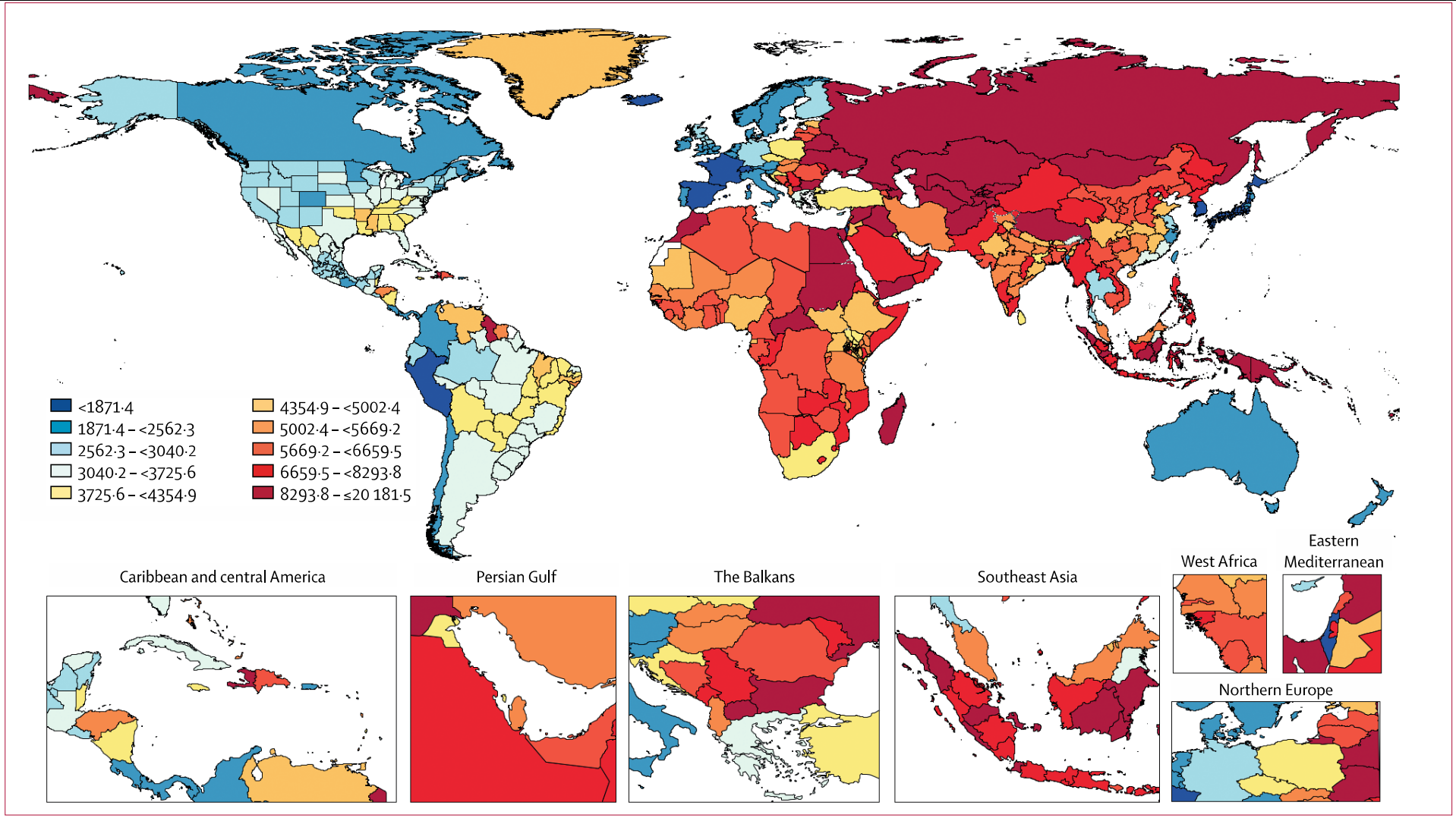


Figure 5: **Age-standardised DALY rates (per 100 000) by location, both sexes combined, 2019**

Source: Global Burden of Disease Survey

Global Burden of Cardiovascular Diseases

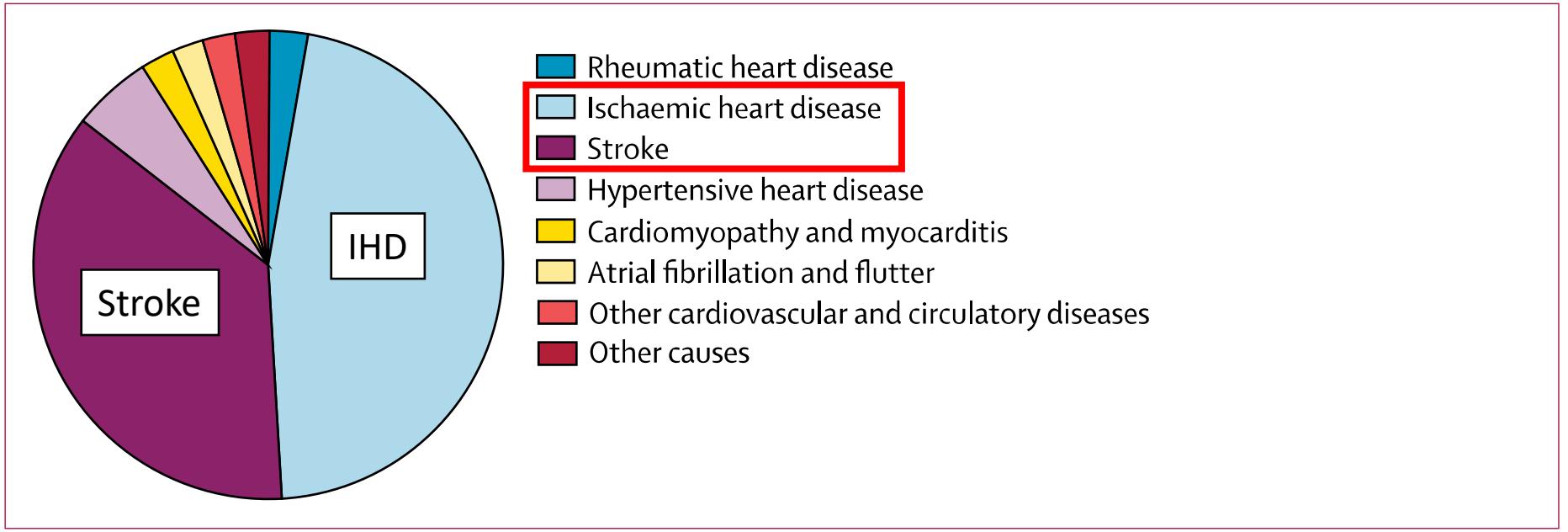


Figure 1: **Composition of DALYs by constituent Level 3 causes for both sexes combined, 2019**

Source: Global Burden of Disease Survey

Percentage of CV Disability Attributable to Common Risk Factors

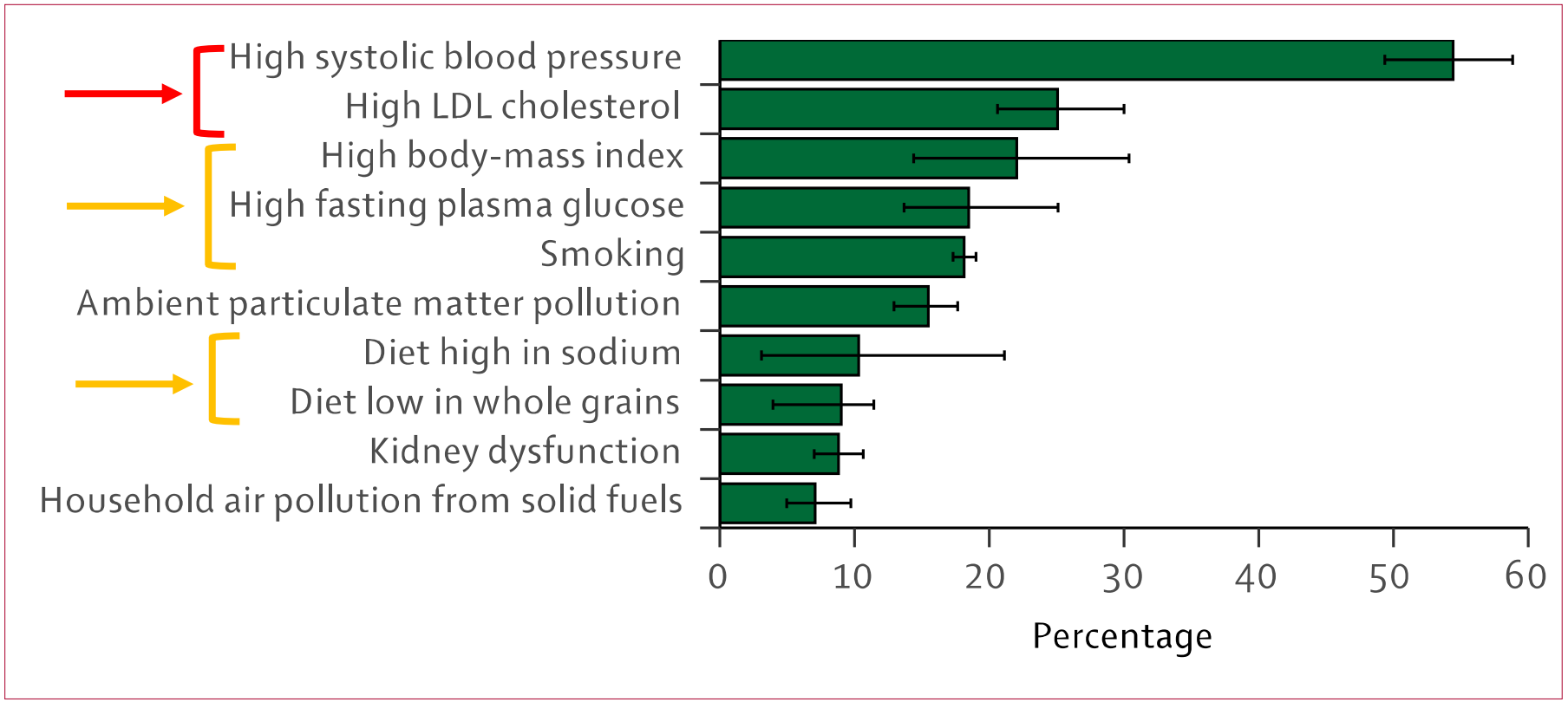


Figure 2: **Percentage of DALYs attributable to top risk factors for both sexes combined, 2019**

Source: Global Burden of Disease Survey

Diet

Why do we care about diet?

- Everyone has to eat
- What you eat clearly has a huge impact on health
- However, the evidence for the effects of diet are usually observational studies
- Observational studies of diet and nutrition are particularly prone to bias and confounding
- Randomized trials of diet face challenges of adherence, short duration, and surrogate endpoints (BP, weight, lipids)

Evidence-based Cardiovascular Disease Prevention

The New York Times

OPINION

GUEST ESSAY

The Science of What We Eat Is Failing Us

June 19, 2023, 5:00 a.m. ET

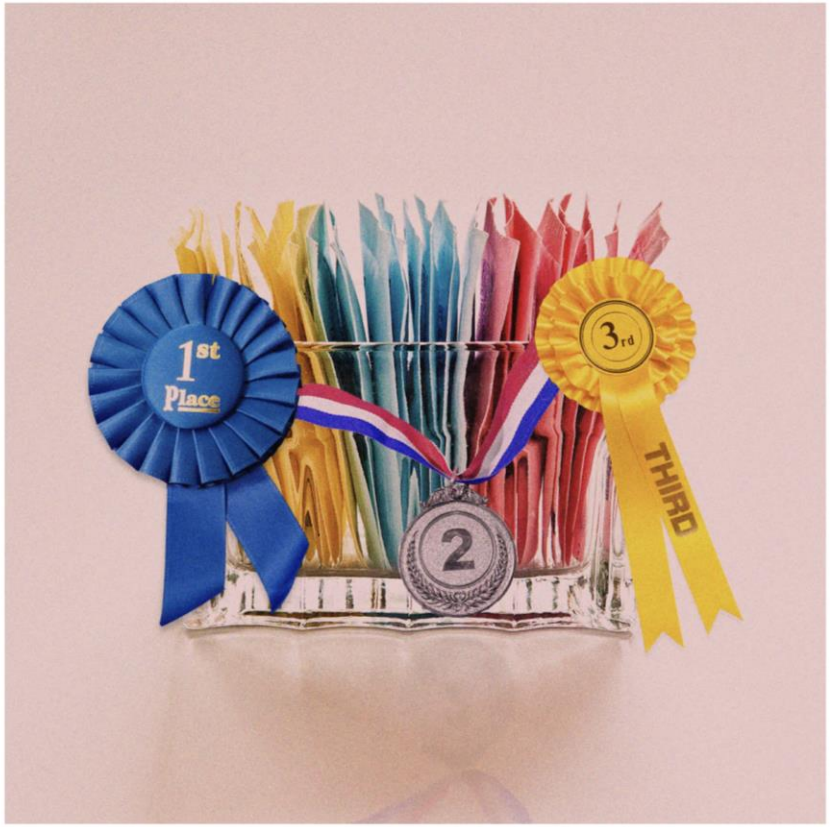


Illustration by The New York Times

By Drs. Anupam B. Jena and Christopher M. Worsham, HMS. NYT, Published June 19, 2023

Diet: Cardiovascular Disease Prevention

- Which diets have been shown to prevent major adverse cardiovascular events?
- Which diets have been shown to modify known cardiovascular risk factors, such as blood pressure, lipids, or weight?
- Common Patient FAQs
  - What should I tell my patients about intermittent fasting or keto diets?
  - What should I tell my patients about drinking alcohol?
  - What's the latest news on eggs? Do they cause heart disease?

Diet RCTs with MACE as an outcome

- PREDIMED (published, retracted, republished – high risk primary prevention)
- LYON HEART STUDY (post MI patients)
- DART (post MI patients)

N Engl J Med 2018; 378:e34 DOI: 10.1056/NEJMoa1800389

PREDIMED

- Conducted in Spain
- 7447 participants at high CV risk but without established CVD
  - Mediterranean diet supplemented with EVOO
  - Mediterranean diet supplemented with mixed nuts
  - Control diet (advice to reduce dietary fat intake)
- Primary outcome: MACE (MI, stroke, CV death)
- Median follow up 4.8 years
- Stopped early for efficacy

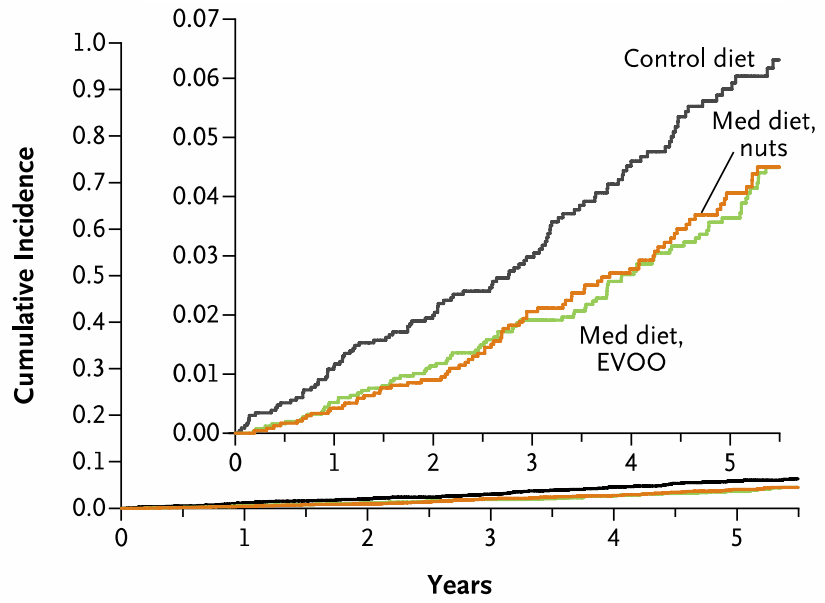
- HOWEVER, a number of protocol deviations, including household member randomization, assignment without randomization, and inconsistent use of randomization tables led to a retraction and reanalysis of the data

N Engl J Med 2018; 378:e34 DOI: 10.1056/NEJMoa1800389

PREDIMED Republished 2018

Acute MI, Stroke, CV Death

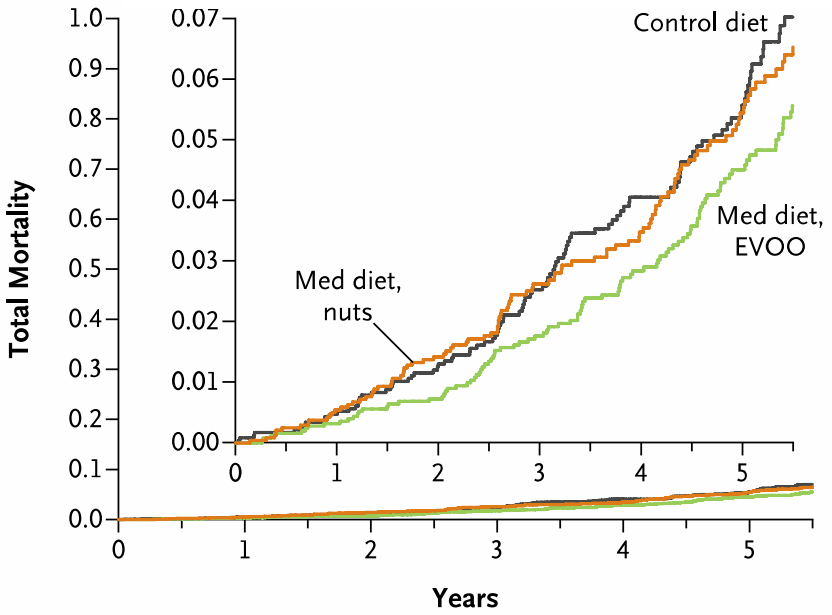
EVOO HR 0.69 (0.53-0.91)
Nuts HR 0.72 (0.54-0.95)



No. at Risk						
Control diet	2450	2268	2020	1583	1268	946
Med diet, EVOO	2543	2486	2320	1987	1687	1310
Med diet, nuts	2454	2343	2093	1657	1389	1031

Total Mortalitv

EVOO HR 0.90 (0.69-1.18)
Nuts HR 1.12 (0.86-1.47)



No. at Risk						
Control diet	2450	2270	2027	1586	1272	949
Med diet, EVOO	2543	2486	2324	1991	1691	1310
Med diet, nuts	2454	2345	2097	1662	1395	1037

N Engl J Med 2018;378:e34. DOI: 10.1056/NEJMoa1800389

PREDIMED: Body weight and waist circumference

No significant effects of randomly assigned treatment group on weight or waist circumference

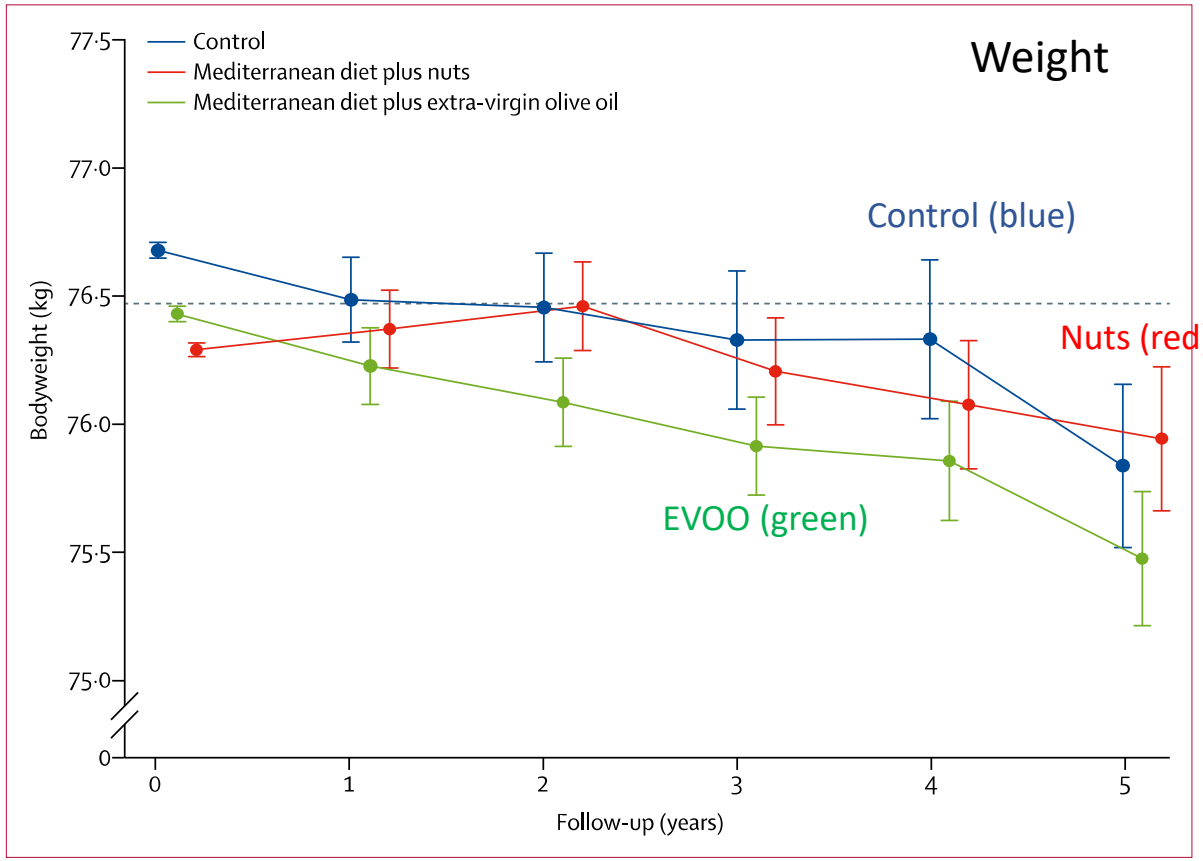


Figure 2: **Multivariable-adjusted average bodyweight of PREDIMED participants during follow-up, by intervention group**

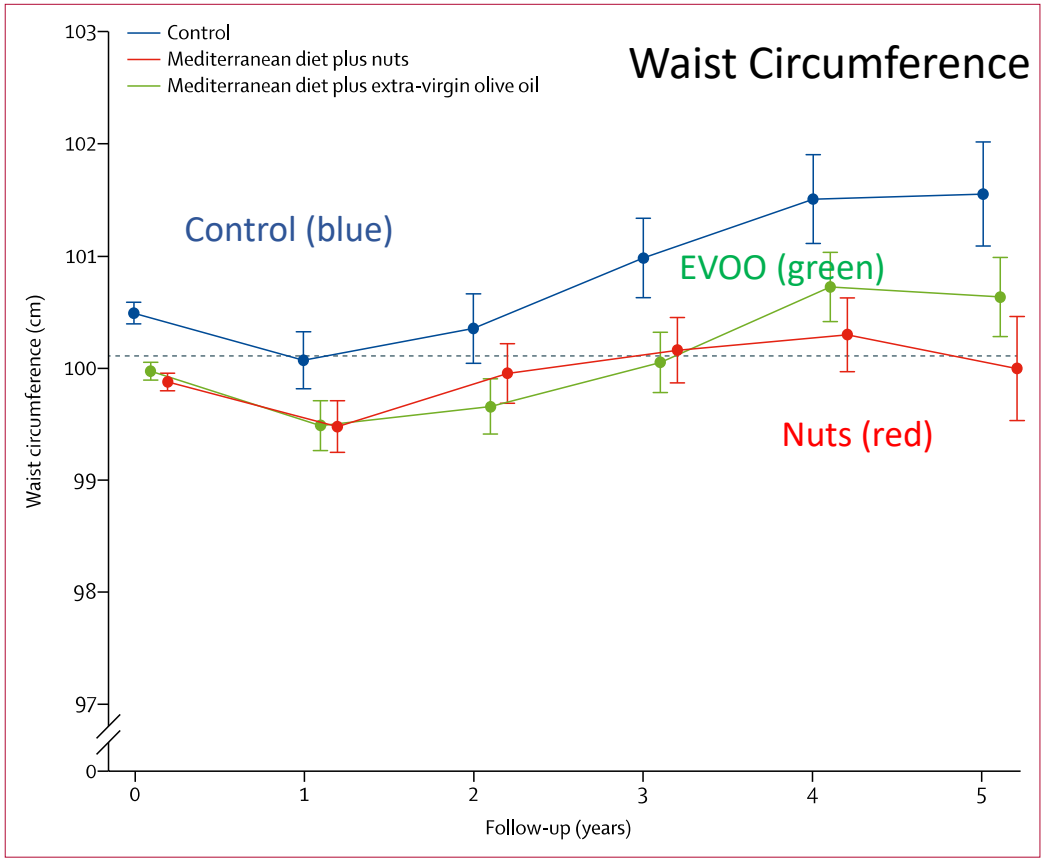


Figure 3: **Multivariable-adjusted average waist circumference of PREDIMED participants during follow-up, by intervention group**

Estruch et al. Lancet Diabetes Endocrinol 2019; 7: e6–17

Lyon Heart Study

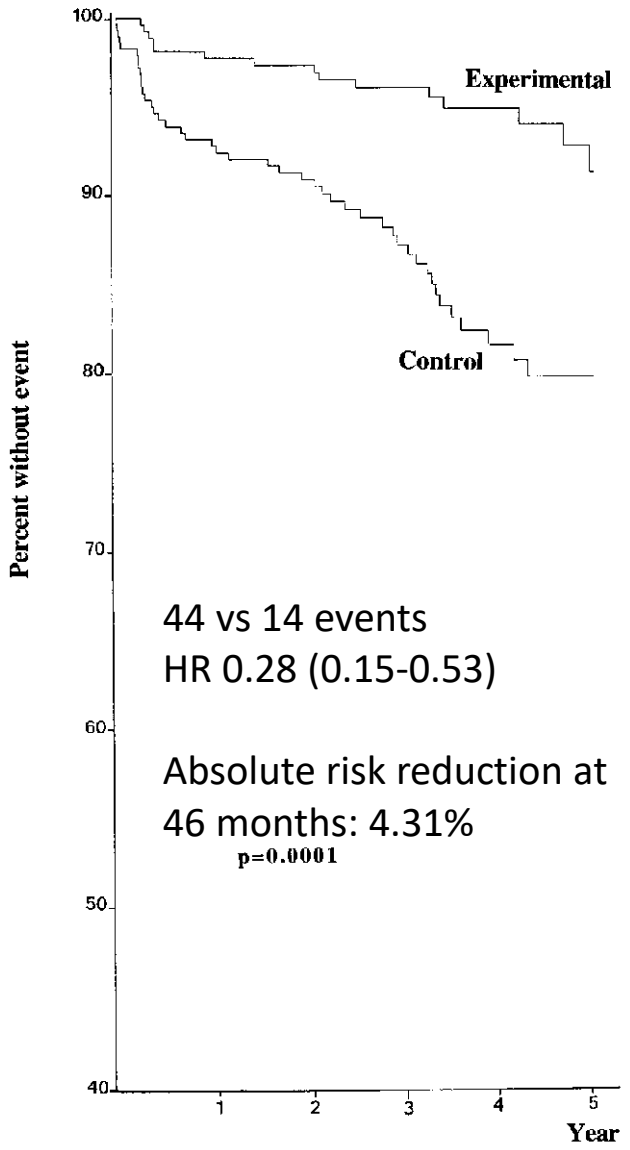
- Randomized, single blind trial of Mediterranean diet vs. “prudent” Western-type diet to reduce recurrence after a first MI
- 423 patients randomized
- Mean follow up was 45-46 months

- Primary outcomes:
  - CO1: MI or CVD death
  - CO2: MI, unstable angina, HF, stroke, pulmonary or peripheral embolism, or CV death
  - CO3: CO2 PLUS hospital admission, recurrent stable angina, postangioplasty restenosis, surgical or percutaneous revasc, thrombophlebitis

Lancet. 1994 Jun 11;343(8911):1454-9. doi: 10.1016/s0140-6736(94)92580-1.
de Lorgeril M et al. Circulation. 1999;99:779-785.

Lyon Heart Study

CO 1: MI or CV Death

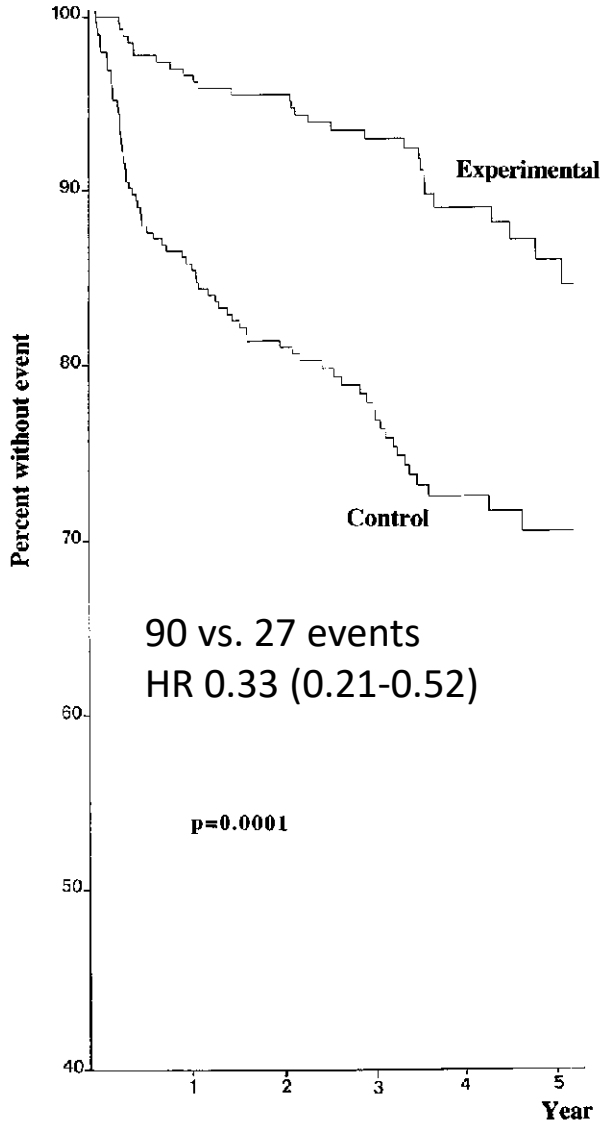


44 vs 14 events
HR 0.28 (0.15-0.53)

Absolute risk reduction at 46 months: 4.31%

Figure 1. Cumulative survival without nonfatal myocardial infarction (CO 1) among experimental (Mediterranean group) patients and control subjects.

CO 2: MI, unstable angina, HF, stroke, pulmonary or peripheral embolism, or CV death



90 vs. 27 events
HR 0.33 (0.21-0.52)

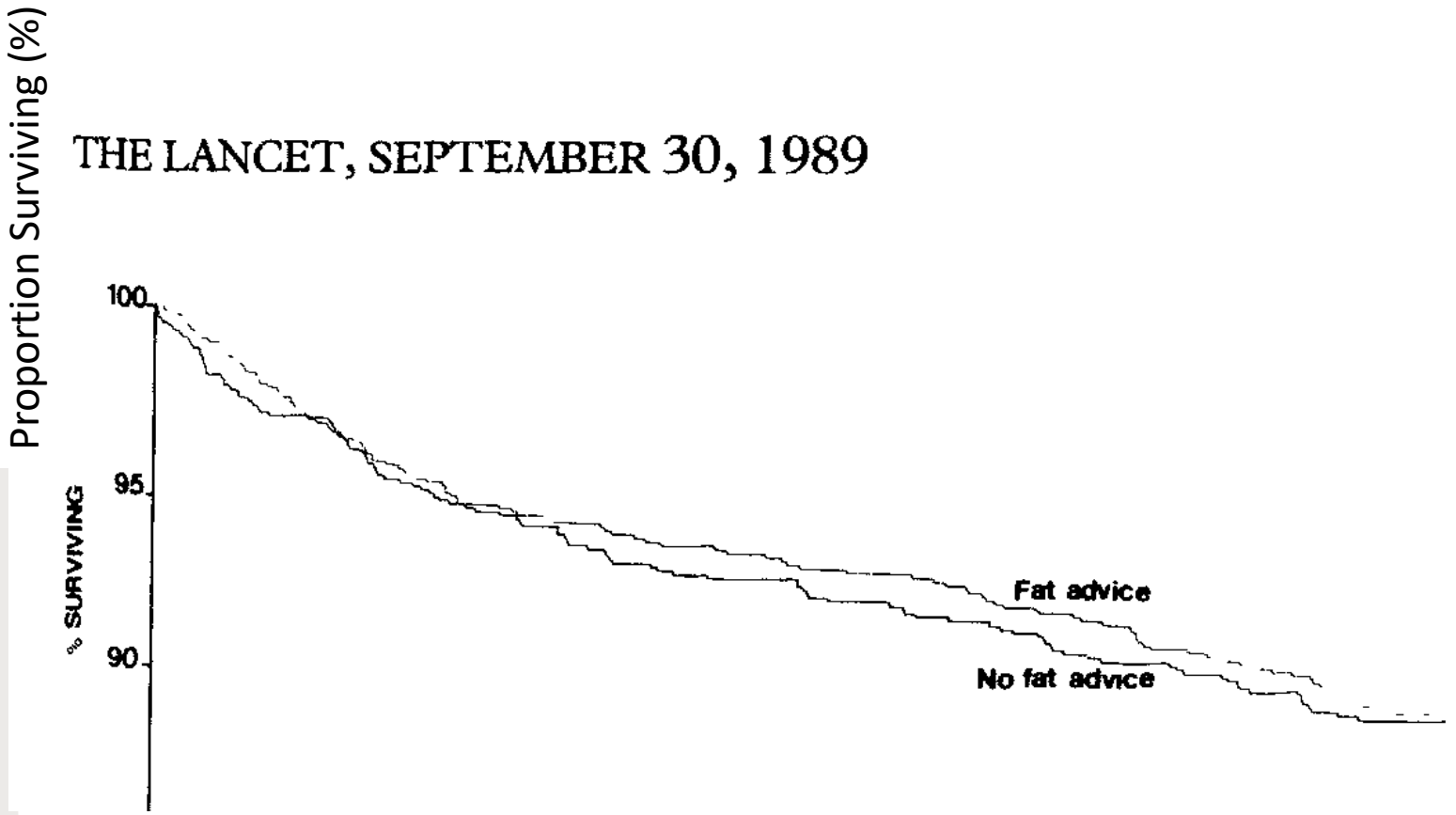
Figure 2. Cumulative survival without nonfatal infarction and without major secondary end points (CO 2).

de Lorgeril M. Circulation 1999;99:779

DART (Diet and Reinfarction Trial)

- Post MI randomized comparison on three things:
- Reduce fat and increase poly unsaturated fat
- Increase cereal fiber intake
- Increase fatty fish intake to 2-3 portions per week
- None of the diets affected composite primary outcome of recurrent MI + death from ischemic heart disease

Effect of 2-3 portions of fatty fish on <u>all-cause mortality</u> post MI



Burr ML et al. 1989 Sep 30;2(8666):757-61. doi: 10.1016/s0140-6736(89)90828-3. PMID: 2571009

Evidence summary

- The Mediterranean diet is the only diet supported by evidence that it reduces hard cardiovascular outcomes (MI, stroke, CV death)
- There is really only 1 trial of about 7,000 patients that supports this recommendation
- The Lyon heart study and DART are now nearly 35 years old, were small, unblinded, and saw benefits that are too large to be realistic (at least in 2023)

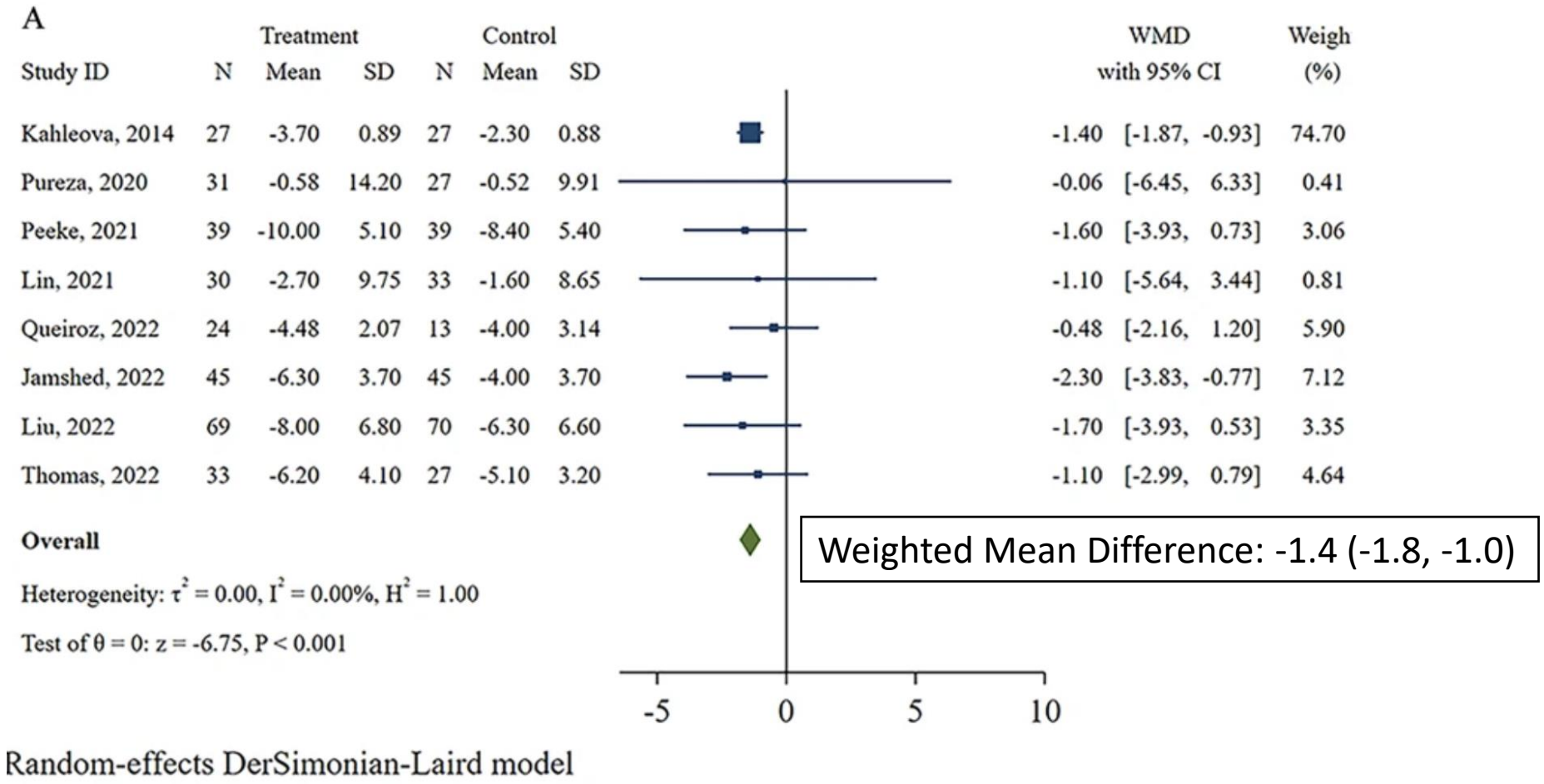
- More information on dietary approaches to BP coming shortly…

Special Diet Topics

- Time restricted eating

Time Restricted Eating: Meta analysis of RCTs

Change in Body Weight

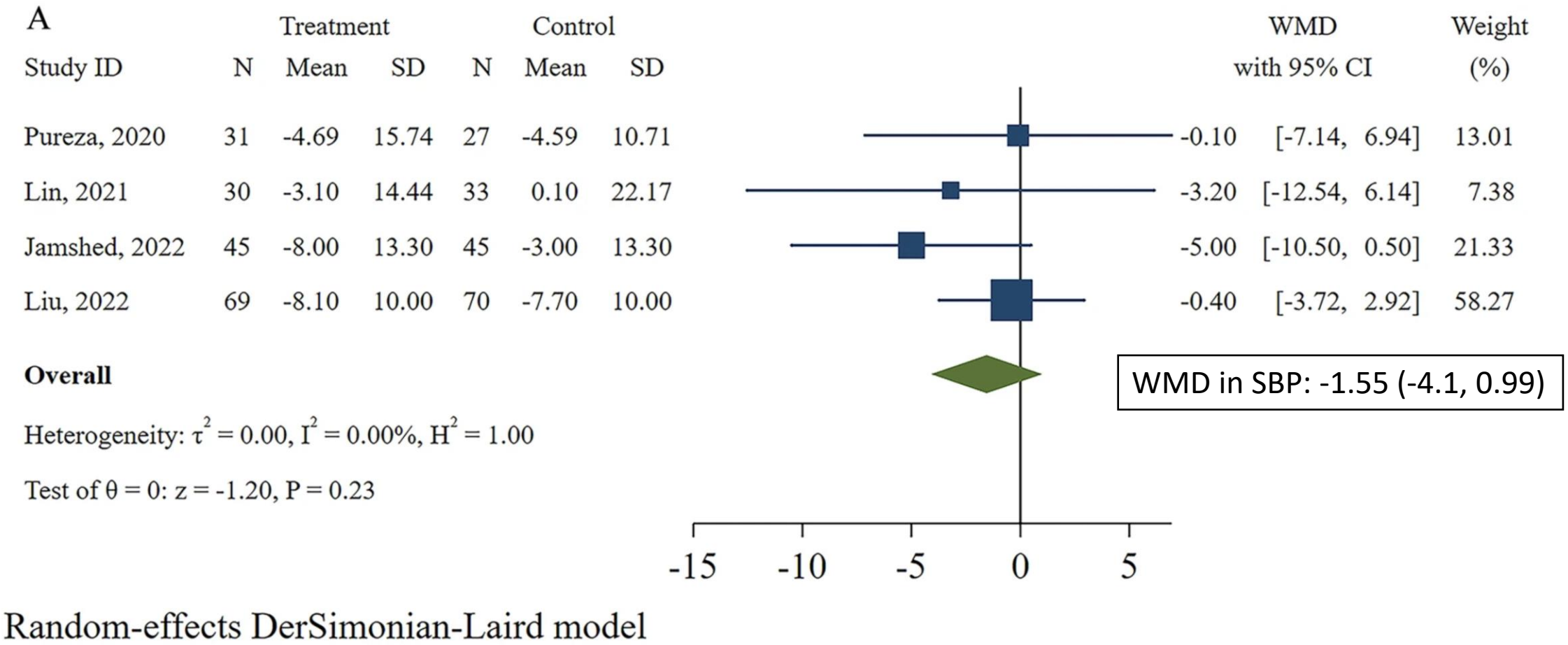


Weighted Mean Difference: -1.4 (-1.8, -1.0)

Weighted mean difference in waist circumference: -0.73 (-1.4, -0.1)

Sun J-C et al. Eur J Clin Nutr 2023. https://doi.org/10.1038/s41430-023-01311-w

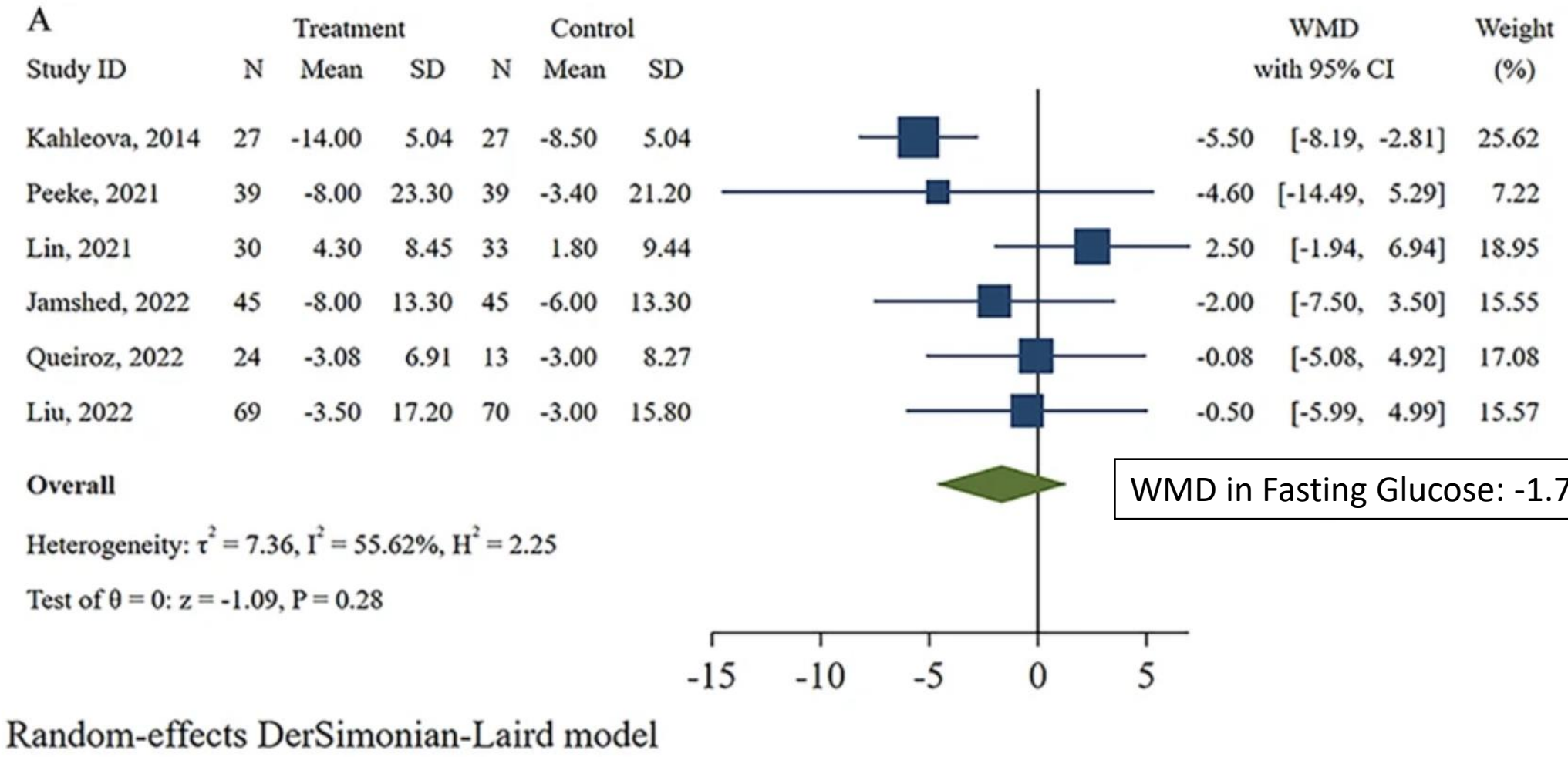
Time Restricted Eating: Effect on SBP



WMD in SBP: -1.55 (-4.1, 0.99)

Sun J-C et al. Eur J Clin Nutr 2023. https://doi.org/10.1038/s41430-023-01311-w

Time Restricted Eating: Effect on Fasting Glucose

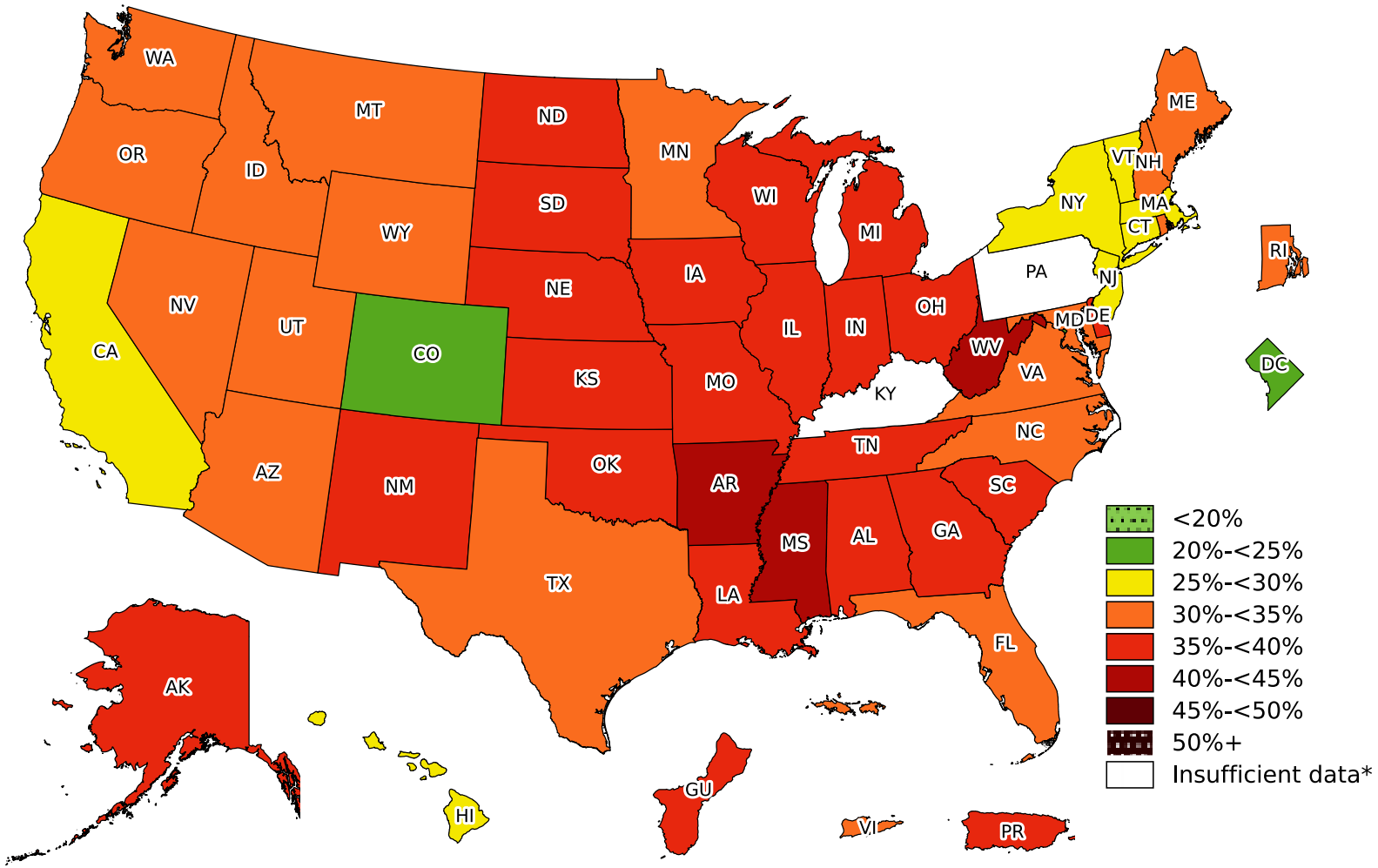


WMD in Fasting Glucose: -1.7 (-4.7, 1.35)

No changes in cholesterol observed.

What about treating obesity?

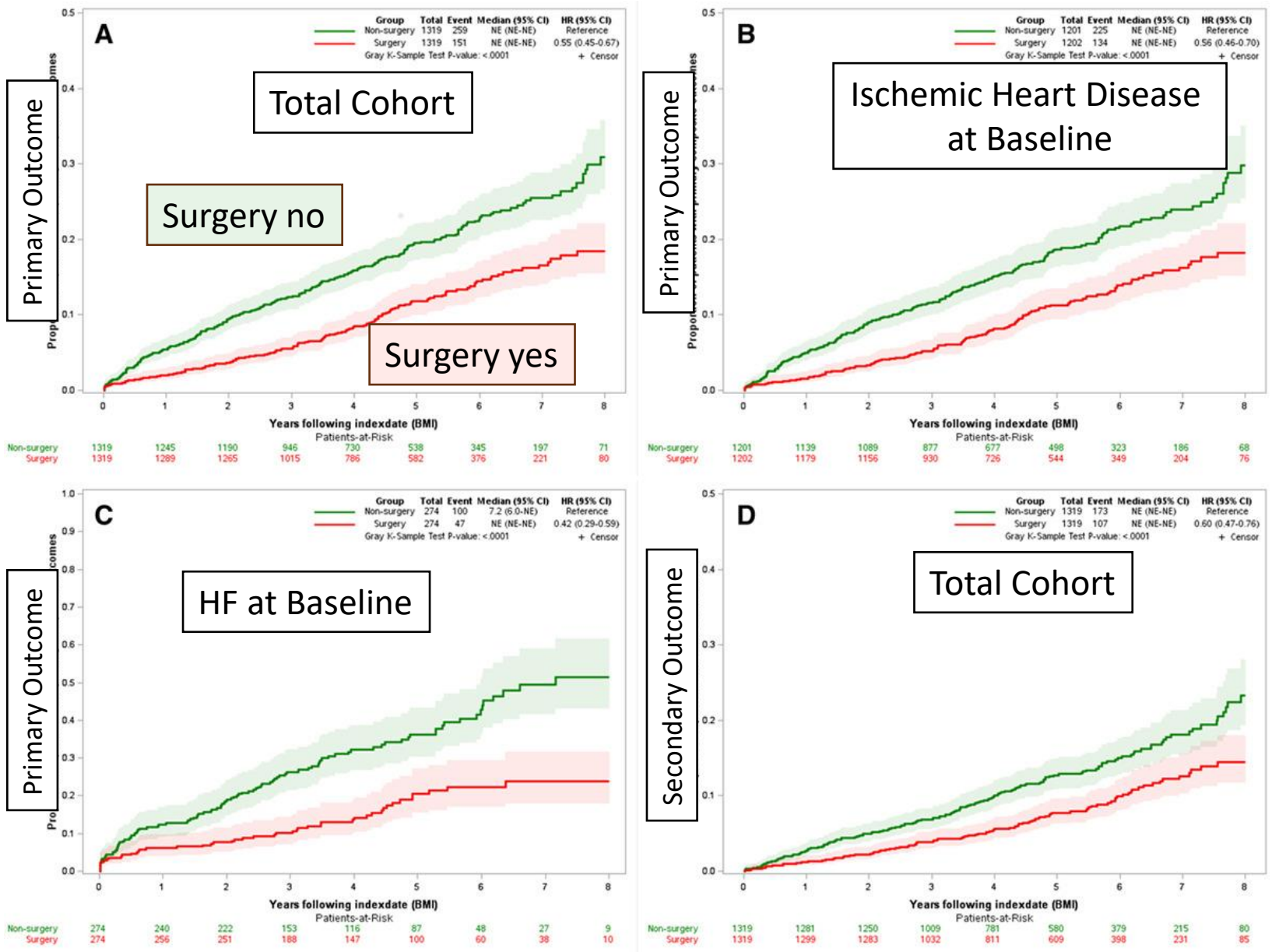
Prevalence of Obesity (BMI ≥ 30) in 2023



https://www.cdc.gov/obesity/data-and-statistics/adult-obesity-prevalence-maps.html

Bariatric Surgery and CVD Outcomes

- Propensity matched cohort study of 2638 patients from Ontario
- Patients with established ischemic heart disease or heart failure
- **Primary outcome was extended MACE (all cause mortality, MI, coronary revasc, cerebrovascular events, HF hospitalization**)
- Secondary outcome MACE (MI, stroke, all-cause mortality)
- HR for primary outcome 0.58 (0.48-0.71)
- HR for secondary outcome 0.66 (0.52-0.84)
- Similar for those with HF or ischemic heart disease at baseline.



Doumouras et al. Circulation 2021. DOI: (10.1161/CIRCULATIONAHA.120.052386)

SELECT TRIAL: Patients with obesity and CVD but no T2D

- Patients ≥ 45 years with established CVD
- BMI ≥ 27 kg/m^2 no T2D
- Semaglutide 2.4 mg vs. placebo
- 17,604 followed for 40 mos
- 20% reduction MACE

A. Primary: MI, stroke, CV death

B. CV death

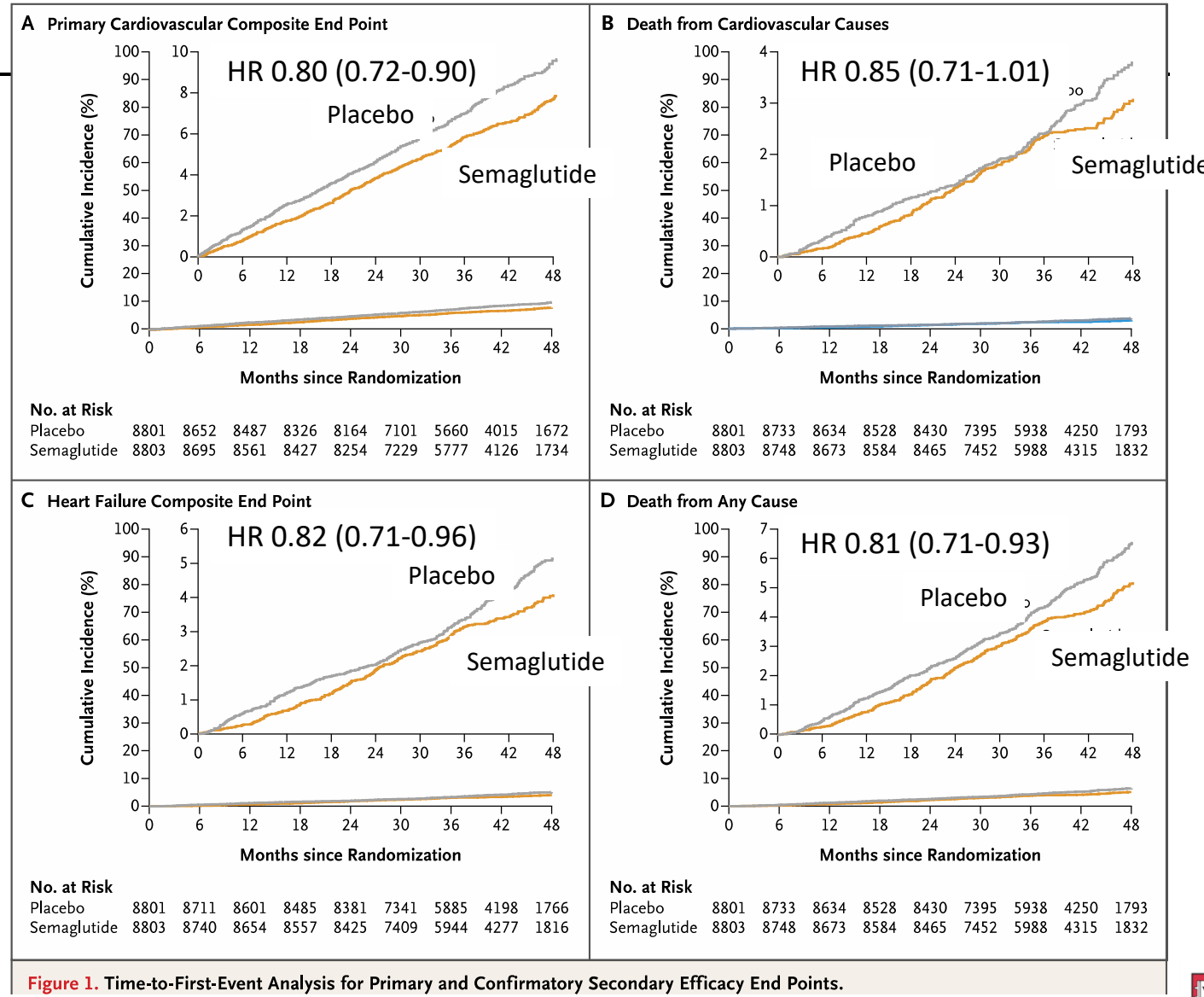


Figure 1. Time-to-First-Event Analysis for Primary and Confirmatory Secondary Efficacy End Points.

C. HF composite outcome

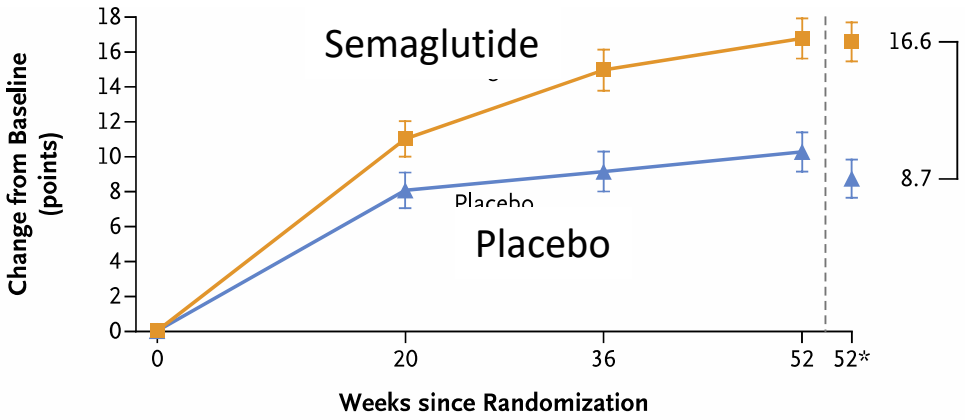
D. All-cause death

N Engl J Med 2023;389:2221-32.
DOI: 10.1056/NEJMoa2307563

STEP-HFpEF: Weight Reduction in Patients with obesity and HFpEF but no T2D

- 529 subjects with BMI≥30 and HFpEF but no T2D
- Randomized to semaglutide 2.4mg weekly or placebo
- Coprimary endpoints: change in KCCQ and body weight

A. Change in Kansas City Cardiomyopathy Questionnaire – clinical summary score



B. Change in Body Weight

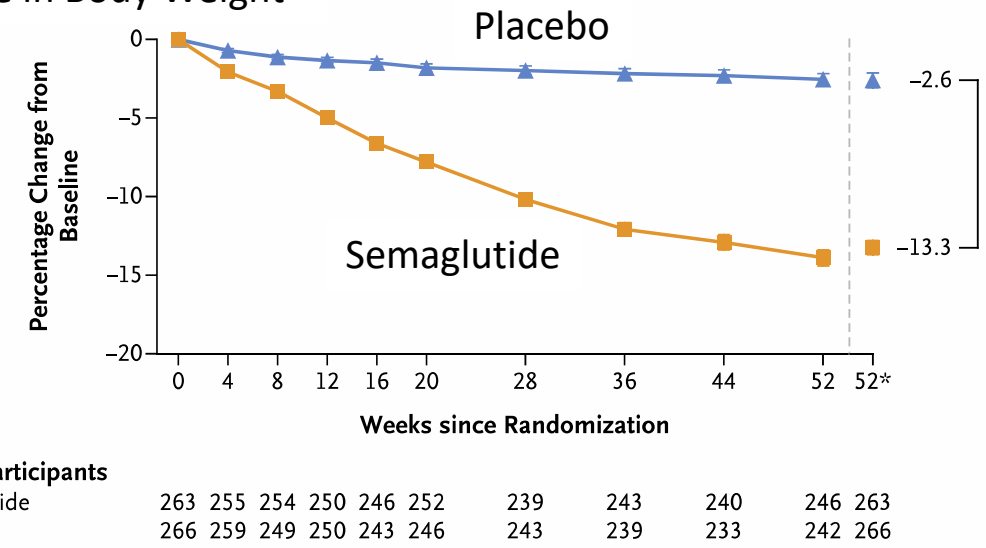
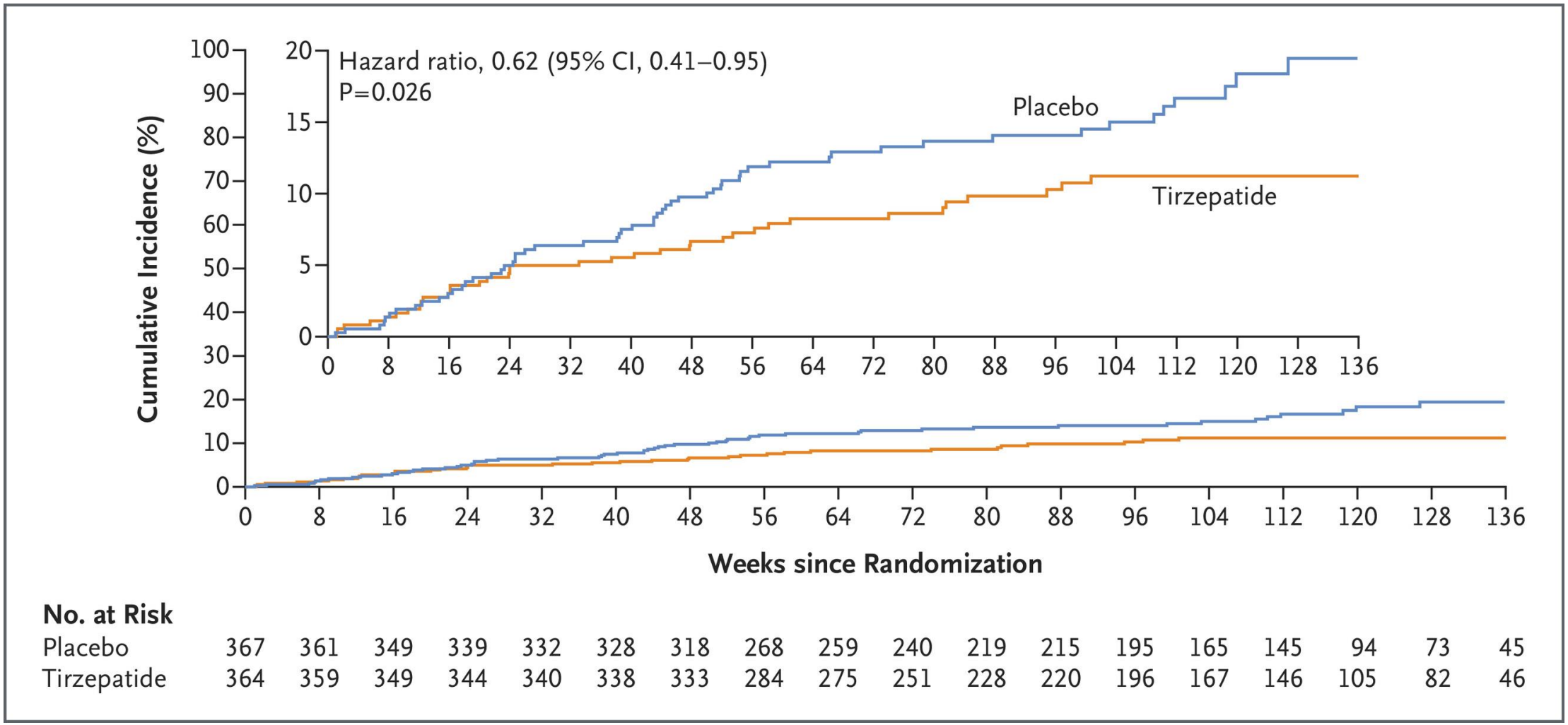


Figure 1. Changes from Baseline to Week 52 in the Dual Primary End Points.

N Engl J Med 2023;389:1069-84.
DOI: 10.1056/NEJMoa2306963

SUMMIT Trial: Tirzepatide in patients with HFpEF and Obesity: Composite of CV Death or a worsening heart failure event



N Engl J Med 2025;392:427-37.
DOI: 10.1056/NEJMoa2410027

Proven benefits of treatments associated with decent weight loss interventions

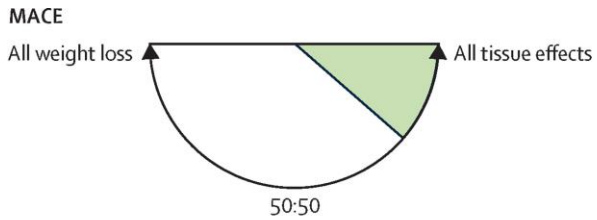
• ↑QOL, CR fitness	**Yes**
• T2D remission/prev^{n}	Yes (50% to **93%)**
• BP reduction	Yes (up to 8/4 mmHg)
• Improvement lipids	Yes (↓ **trigs,** ↑HDL-c, LDLc?)
• HF benefits	Yes (STEP HFpEF /SUMMIT trials)
• Slow CKD progression	Yes – more data in non-DM needed
• MACE	Yes – SELECT trial
• OSA/OA/ MASLD	Yes 5-6 trials
• LONG COVID	Yes, fatigue benefit

Slide courtesy of Naveed Sattar MD PhD

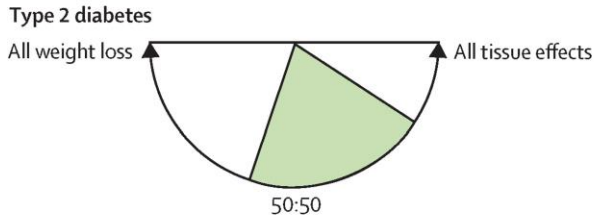
Incretin therapy: Weight loss or direct tissue effects?

All weight loss ⟷ All tissue effects

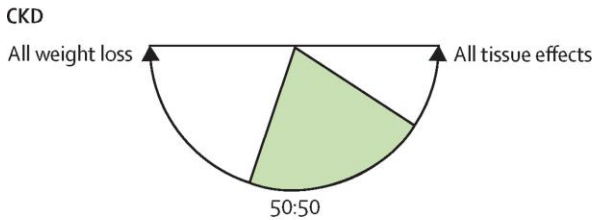
MACE



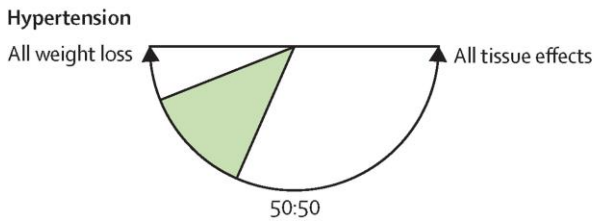
T2D



CKD

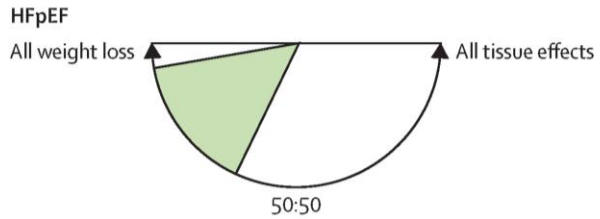


Hypertension

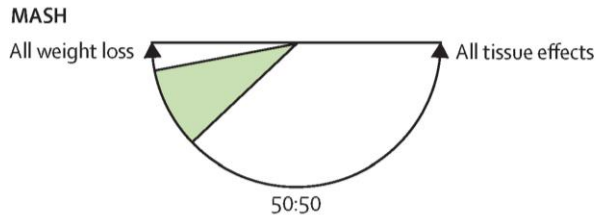


All weight loss ⟷ All tissue effects

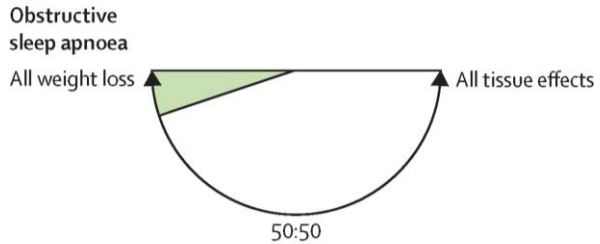
HFpEF



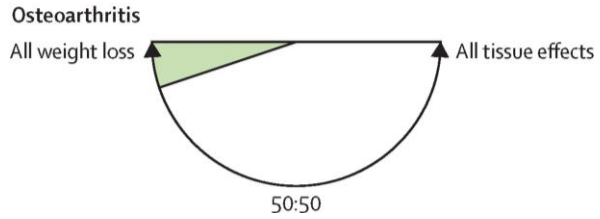
MASH



OSA



Osteoarthritis



Sattar and Lee. Lancet Diabetes Endocrinol 2025; 13: 347–54

Smoking cessation

Cigarette smoking and CV risk

- Help your patients quit smoking!
  - Ask about tobacco use
  - Tell them they should quit
  - Assess whether they're ready to quit
  - Help them quit if they're ready
- Pharmacotherapy
  - Nicotine patch, gum, lozenge, and inhalers
  - Varenicline (Chantix)
  - Buproprion (Wellbutrin, Zyban)

Pharmacotherapy

- Nicotine replacement therapy (patch, gum, lozenge, etc)
- Varenicline
  - 0.5 mg daily x 3 days, then 0.5mg BID x 4 days, then 1 mg BID for 12-week course
  - The FDA removed the boxed warning about neuropsychiatric side effects in 2016
  - There does not appear to be an increased risk of CV events with varenicline
  - Patients instructed to quit smoking 1 week after starting varenicline

- Buproprion
  - 150 mg daily x3 days, then 150 mg BID for a 12-week course

Blood pressure

Blood Pressure

- Hypertension is an important contributor to CV risk
- Definition: SBP ≥ 130 mm Hg, DBP ≥ 80 mm Hg
- Goal BP depends on comorbidities such as T2D, CKD, age, etc.

Initial approach to elevated BP

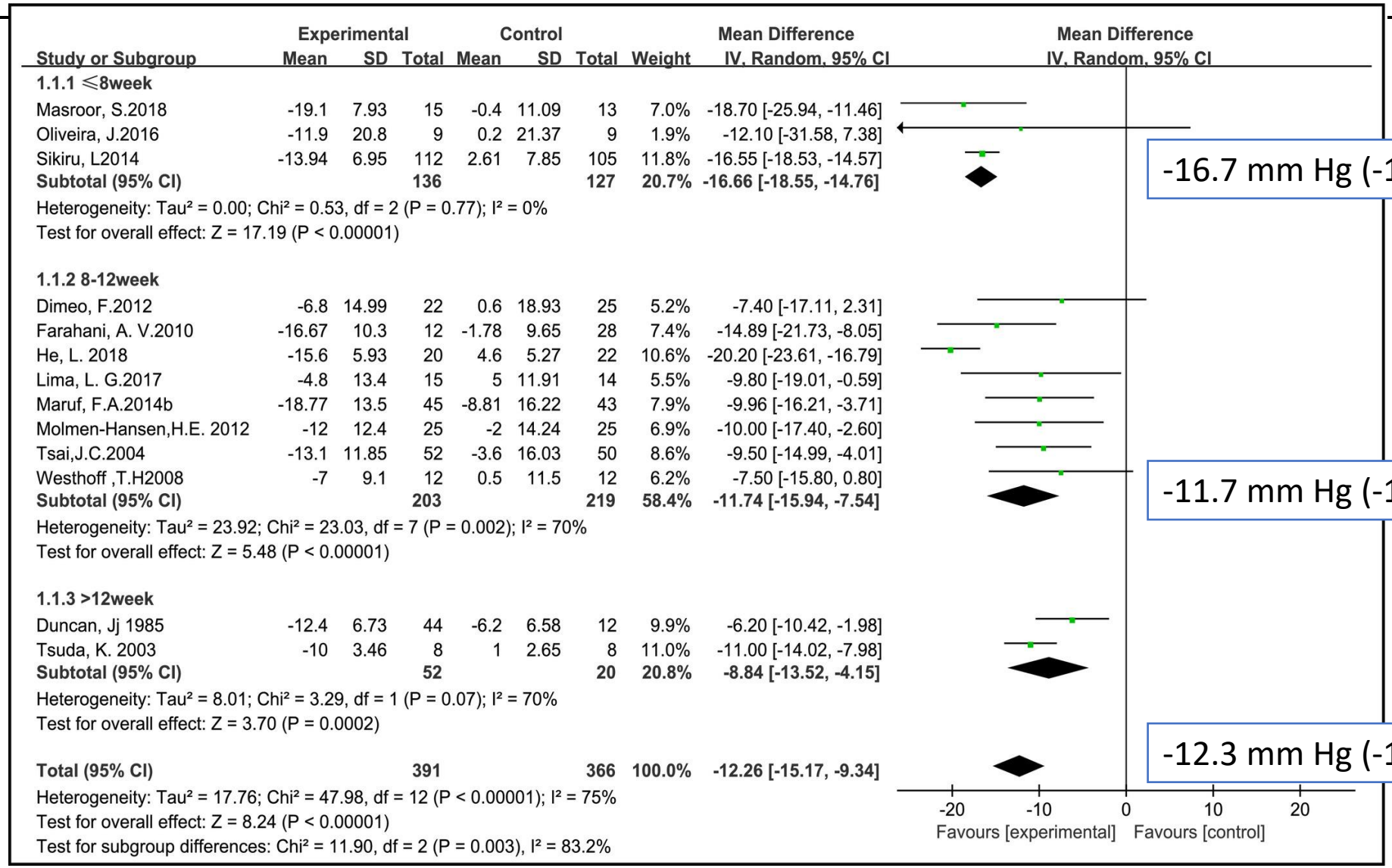
- Exercise
- Weight loss
- DASH diet, Lacto-ovo-vegetarian diet
    - Each diet associated with a ~5 mm Hg reduction in BP
- Avoidance of excessive alcohol intake

Exercise can reduce systolic and diastolic BP: Meta-analysis of RCTs

≤8 week

8-12 week

>12 week



-16.7 mm Hg (-18.6, -14.8)

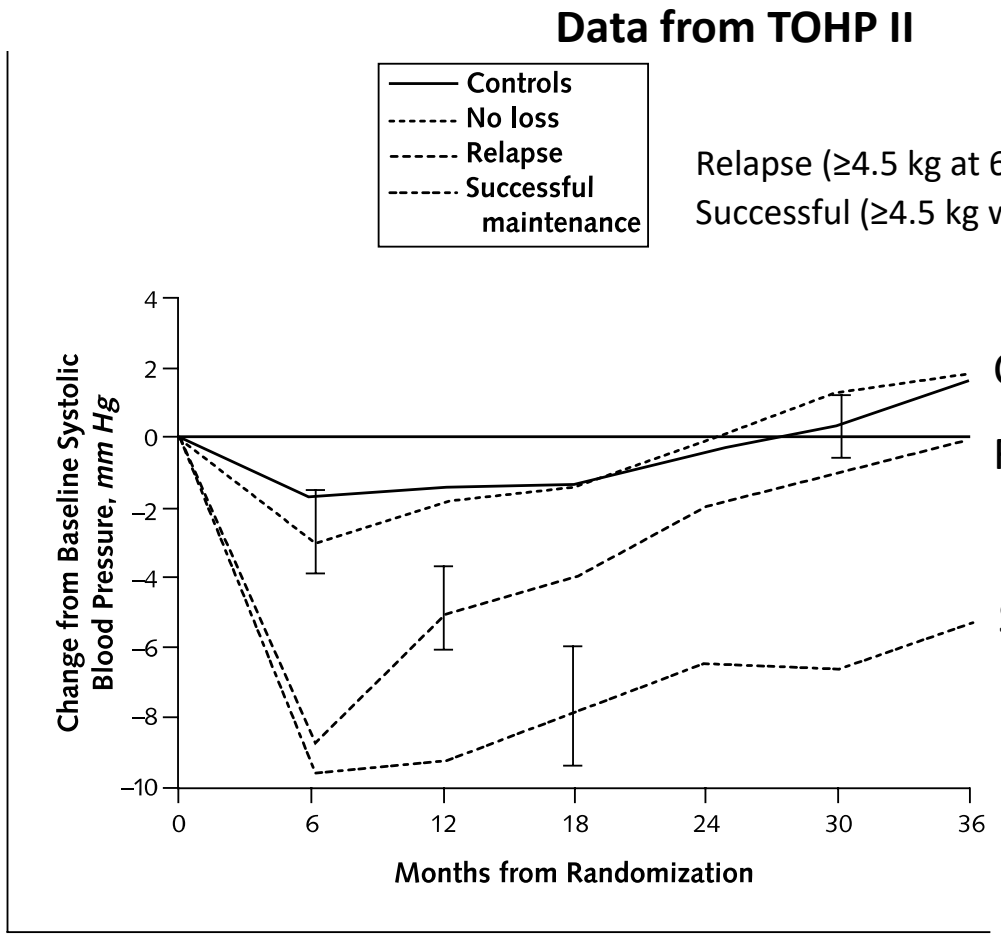
-11.7 mm Hg (-15.9, -7.5)

-12.3 mm Hg (-15.2, -9.3)

Liujiao et al. JC Hypertension. 2019. https://doi.org/10.1111/jch.13583

Weight change and BP reduction

Meta-analysis: 1 kg weight loss -> 1 mm Hg drop in BP



Data are adjusted for age, ethnicity, and sex, according to patterns of weight change. Usual care controls were not assigned to intervention. Participants with successful maintenance of weight loss were defined as those who lost 4.5 kg or more at 6 months and maintained at least 4.5 kg of weight loss at 36 months. Participants with relapse were those who lost at least 4.5 kg at 6 months but whose weight loss at 36 months was less than 2.5 kg. Participants with no weight loss had weight loss of 2.5 kg or less at 6 and 36 months. Error bars represent 95% CIs.

Stevens et al. Ann Intern Med. 2001;134:1-11.
Neter et al. Hypertension 2003;42:878

DASH diet: 5 mmHg blood pressure reduction

Key Points

- Fresh fruits and vegetables
- Lean meats, and less of them
- Avoid saturated fats
- Avoid processed or prepared foods
- Avoid foods with salt

- Associated with a ~5 mm Hg reduction in BP

Food Group	Daily Servings	What is "1 serving"?
Grains and grain products	7-8	1 slice bread, 1 cup cereal
Vegetables	4-5	1 cup raw, ½ cup cooked
Fruits	4-5	1 medium fruit, 6 ounces fruit juice
Lowfat or fat-free dairy	2-3	8 ounces milk, 1 cup yogurt
Lean meats, poultry and fish	2 or fewer	3 ounces cooked lean meat, skinless poultry, fish
Nuts, seeds, dry beans	4-5 per week	1/3 cup or 1.5 ounces nuts ½ cup cooked dry beans
Fats and oils	2-3	1 teaspoon margarine, 1 tablespoon lowfat mayo, 2 tablespoons light salad dressing
Sweets	5 per week	1 tablespoon sugar, jelly, or jam

NHLBI Guide to Lowering BP: https://www.nhlbi.nih.gov/files/docs/public/heart/hbp_low.pdf

Pharmacotherapy for elevated BP

- ACE inhibitor OR ARB
- Dihydropiridine calcium channel blocker
- Diuretic (indapamide, chlorthalidone, HCTZ)
- Avoid beta blockers as first line therapy

Risk Stratification and Lipid Lowering Therapy

Lipid Lowering Therapy and Risk Prediction

- Using the AHA/ACC Pooled Cohort Equation for CV Risk Prediction
- Using the novel PREVENT score CV Risk Prediction
- Deciding who to treat
- Deciding when to treat them
- Risk enhancers
- Coronary calcium score

Risk Stratification: Risk Calculators

- ACC/AHA Pooled Cohort Equation
- UK QRISK 3
- European Society of Cardiology: SCORE
- PREVENT (published 11/2023)

Risk Stratification

- ** Treat all patients with an LDL-C ≥ 190 mg/dL ** with a high-intensity statin
- ** Treat all patients with diabetes and LDL-C ≥ 70 mg/dL with a moderate intensity statin

- For patients age 40-75 years
- Low risk: <5% risk of a major CV event in the next 10 years
- Borderline risk 5-7.4% risk of a major CV event in the next 10 years
- Intermediate risk 7.5 to 19.9% risk of a major CV event in the next 10 years
- High risk: 20+%

Consider statin therapy in these patients!

CKM (Cardiovascular Kidney Metabolic) Risk

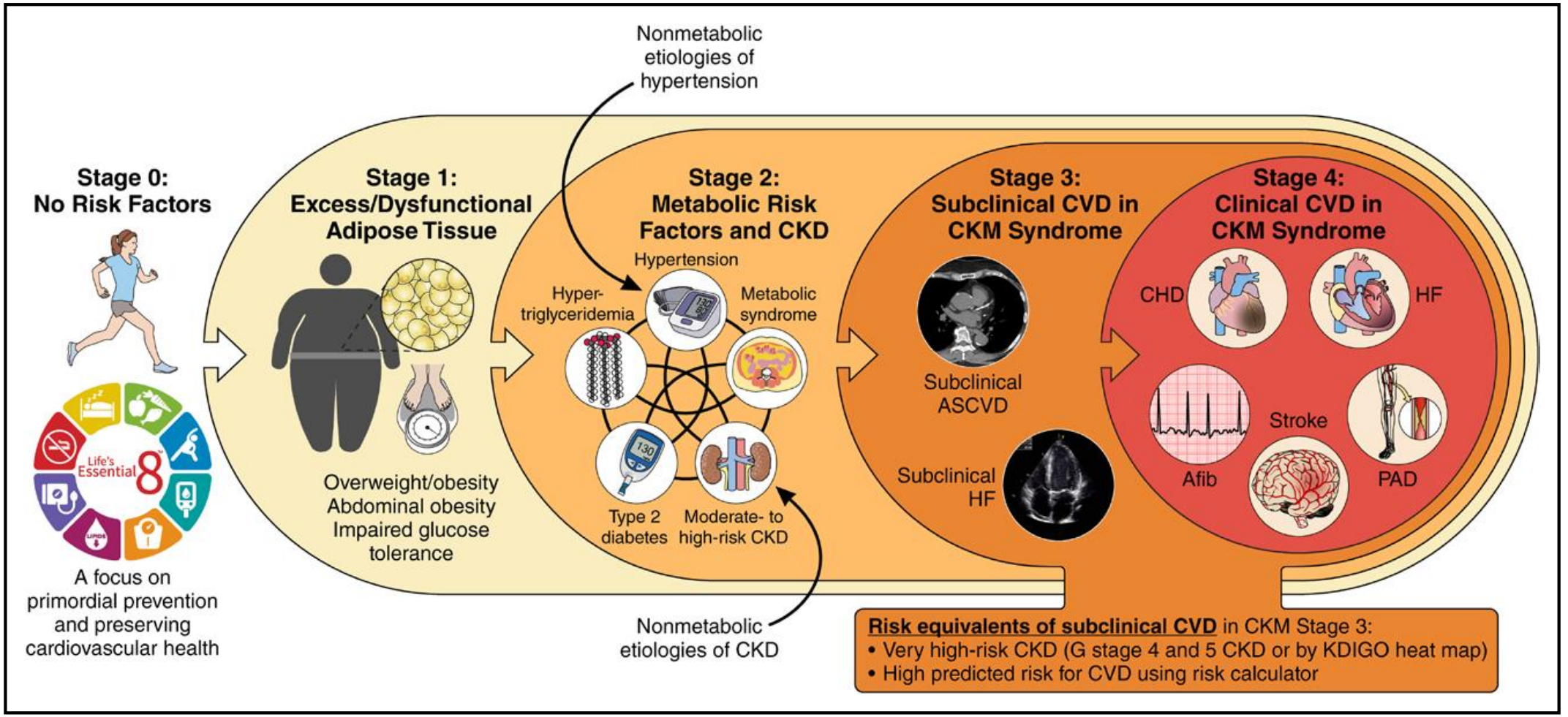


Figure 1. Stages of CKM syndrome.

Ndumele C et al. Circulation. 2023;148:1606–1635. DOI: 10.1161/CIR.0000000000001184

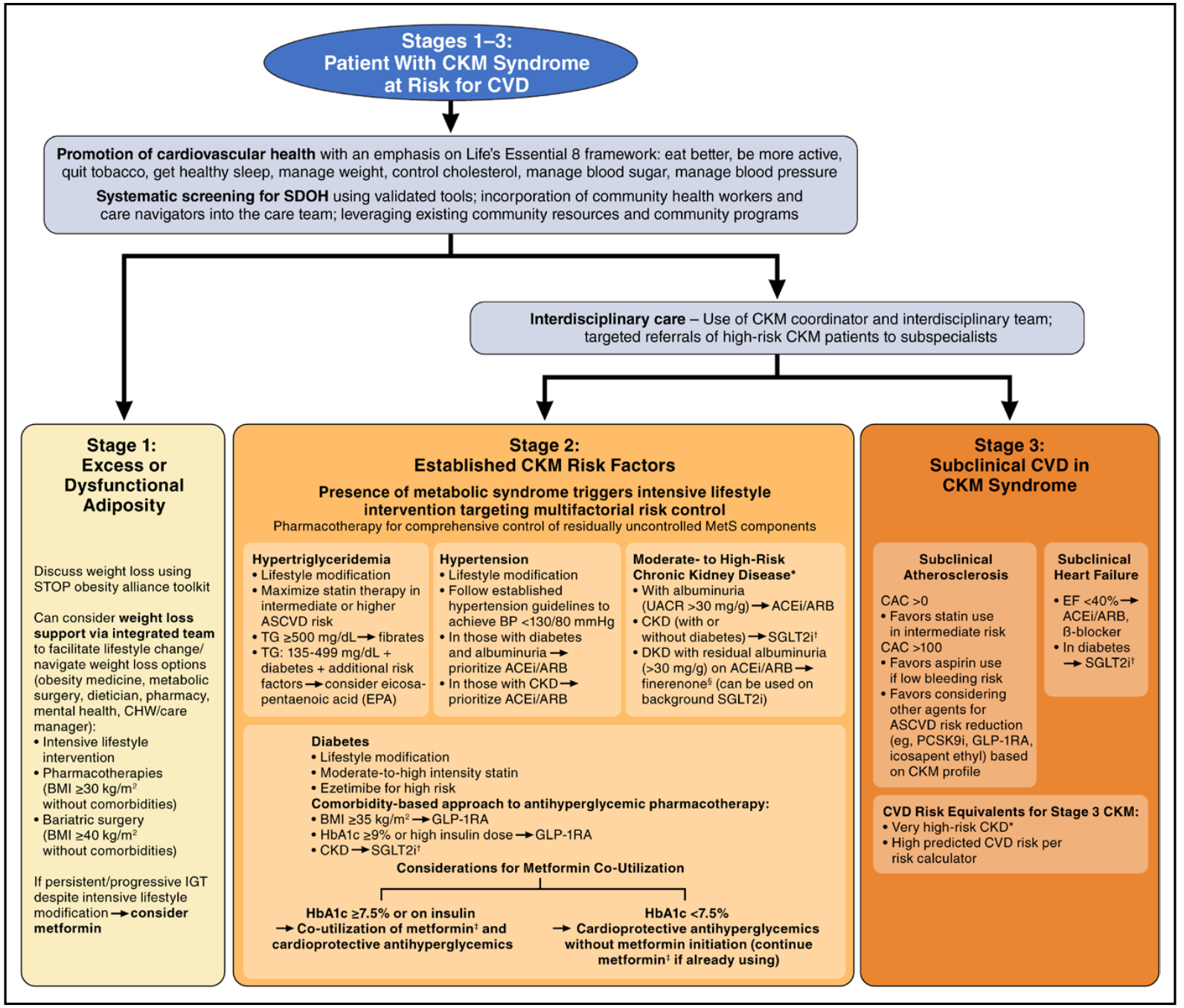


Figure 3. Algorithm for the management of patients with CKM syndrome: Stages 1–3.

Ndumele C et al. Circulation. 2023;148:1606–1635. DOI: 10.1161/CIR.0000000000001184

Risk Enhancing Factors: Consider therapy for those at intermediate risk with a risk enhancer

Risk Enhancing Factors	
Family history of premature CAD (men < 55, women <65)	eGFR 15-59 ml/min/1.73m^2
LDL-C, 160-189 mg/dL Non-HDL-C 190-219 mg/dL	Triglycerides ≥175 mg/dL
Low HDL-C	hsCRP ≥ 2.0 mg/L
Hypertension	Elevated Lp(a) (≥ 50 mg/dL or ≥ 125 nmol/L)
Hyperglycemia	Abdominal obesity
ABI < 0.9	Chronic inflammatory conditions (RA, psoriasis, HIV)
High Apo B (≥130 mg/dL)	History of premature menopause
Low SES	South Asian ancestry

Table 2. Risk-Enhancing Factors for CKM Syndrome*

Chronic inflammatory conditions (eg, psoriasis, RA, lupus, HIV/AIDS)
High-risk demographic groups (eg, South Asian ancestry, lower socioeconomic status)
High burden of adverse SDOH
Mental health disorders (eg, depression and anxiety)
Sleep disorders (eg, obstructive sleep apnea)
Sex-specific risk enhancers (beyond gestational diabetes consideration in stage 1)
History of premature menopause (age <40 y)
History of adverse pregnancy outcomes (eg, hypertensive disorders of pregnancy, preterm birth, small for gestational age)
Polycystic ovarian syndrome
Erectile dysfunction
Elevated high-sensitivity C-reactive protein (≥2.0 mg/L if measured)
Family history of kidney failure; family history of diabetes

CKM indicates cardiovascular-kidney-metabolic; RA, rheumatoid arthritis; and SDOH, social determinants of health.

*These factors increase the likelihood of progression along CKM stages with associated risk for cardiovascular disease and kidney failure.

https://tools.acc.org/ascvd-risk-estimator-plus/#!/calculate/estimate/

AMERICAN COLLEGE of CARDIOLOGY

ASCVD Risk Estimator Plus

Estimate Risk | Therapy Impact | Advice

Current Age * — *Age must be between 20-79*

Sex * — Male | Female

Race * — White | African American | Other

Systolic Blood Pressure (mm Hg) * — *Value must be between 90-200*

Diastolic Blood Pressure (mm Hg) * — *Value must be between 60-130*

Total Cholesterol (mg/dL) * — *Value must be between 130 - 320*

HDL Cholesterol (mg/dL) * — *Value must be between 20 - 100*

LDL Cholesterol (mg/dL) — *Value must be between 30-300*

History of Diabetes? * — Yes | No

Smoker? * — Current | Former | Never

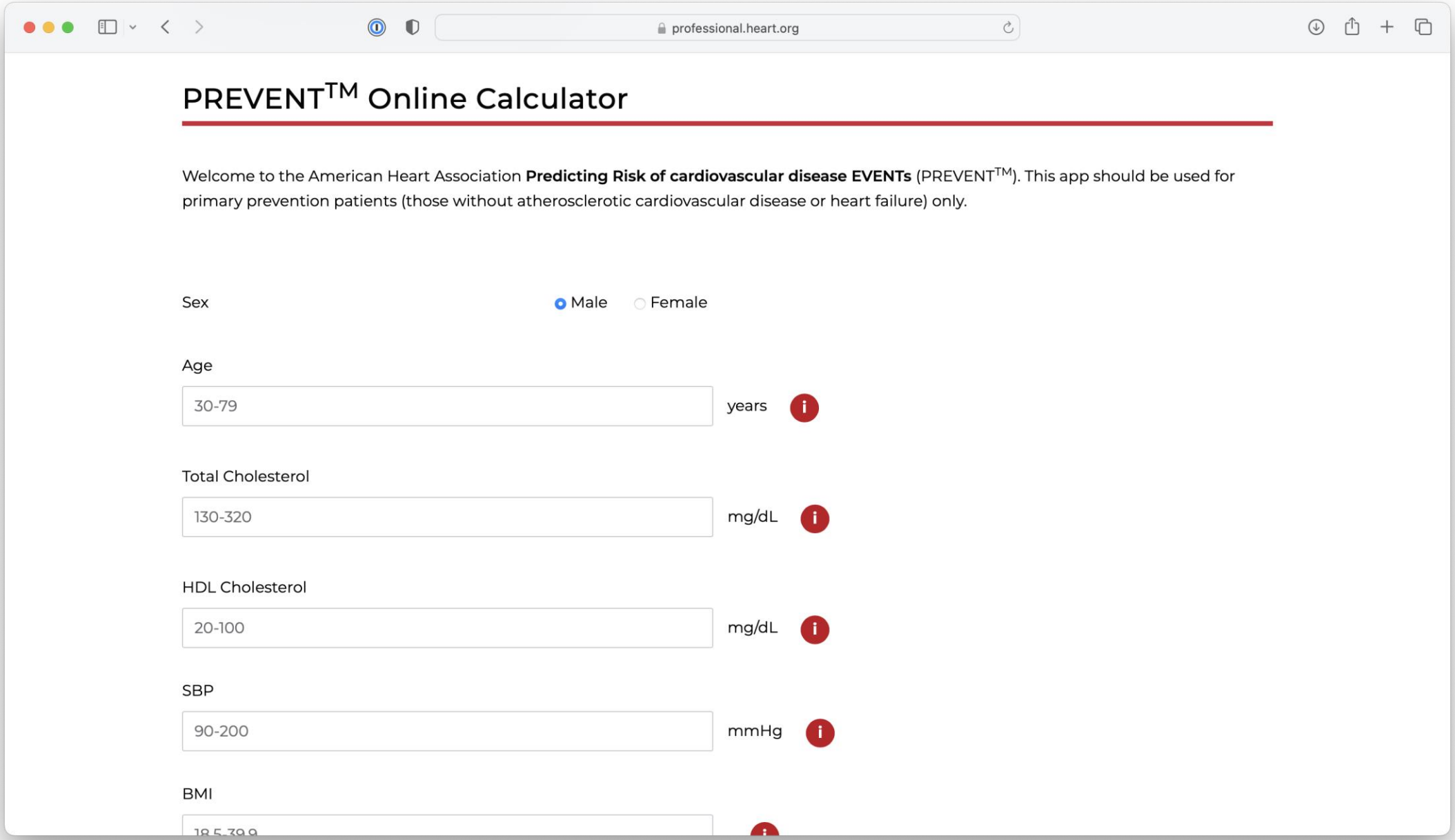
On Hypertension Treatment? * — Yes | No

On a Statin? — Yes | No

On Aspirin Therapy? — Yes | No

Do you want to refine current risk estimation using data from a previous visit? — Yes | No

https://professional.heart.org/en/guidelines-and-statements/prevent-calculator



Patient ARS: What's the risk of cardiovascular disease?

- 46 yo F of South Asian ancestry
- BMI 38
- Father died abruptly from an MI at the age of 50
- Vegetarian, protein from lentils and cheese
- Refined carbohydrates (usually white rice)
- Exercises 4 days a week on the elliptical
- BP 110/74
- TC 222, TG 116, HDL 47, cLDL 152, dLDL 142
- HbA1c 5.3

What do I do next?

Outcome and Timeline	Pooled Cohort Equation	PREVENT equation
10-year ASCVD risk	1.0%	
“Lifetime” ASCVD risk	30%	
30-year risk of ASCVD		
10-year risk of CVD (ASCVD + HF)		
30-year risk of CVD (ASCVD + HF)		
10-year risk of heart failure (HF)		
30-year risk of heart failure (HF)		

AHA Warning Label

Use, please – but wait, do not use!

PREVENT typically has lower risk estimates than PCE, potentially leading to less statin prescription. These estimates are also more accurate! So what do we do?

We revise the guidelines! A revision with new thresholds coming soon.

10-year risk of 1.0 to 1.3%: What do you recommend?

A. Encourage exercise, diet, weight loss

B. Start a statin (LDL = 152 mg/dL, HbA1c 5.3%)

C. Order other biomarker testing (e.g. hsCRP, apoB, or Lp(a))

D. Order a coronary calcium scan

E. Start GLP-1RA pharmacotherapy for weight loss

F. Start aspirin

CAC: When should I order a Coronary Artery Calcium Scan?

- Borderline Risk (5-7.4%)
- Intermediate Risk patients (7.5-19.9%)
- When there is a question about whether to initiate statin therapy

- You should NOT do a follow up scan to follow progression!

CAC results

- 0 Agatston units – No identifiable disease
- 1 to 99 Agatston units – Mild disease (MESA event rate 12.2%)
- 100 to 399 Agatston units – Moderate disease (MESA event rate 21%)
- ≥400 Agatston units – Severe disease

- MESA Calculator: https://www.mesa-nhlbi.org/Calcium/input.aspx

What should I do about aspirin?

Who should take aspirin?

U.S. Preventive Service Task Force

Recommendation Summary

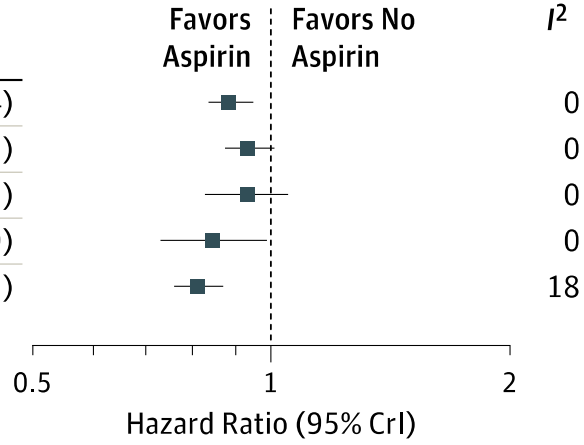
Population	Recommendation	Grade
Adults aged 40 to 59 years with a 10% or greater 10-year cardiovascular disease (CVD) risk	The decision to initiate low-dose aspirin use for the primary prevention of CVD in adults aged 40 to 59 years who have a 10% or greater 10-year CVD risk should be an individual one. Evidence indicates that the net benefit of aspirin use in this group is small. Persons who are not at increased risk for bleeding and are willing to take low-dose aspirin daily are more likely to benefit.	C
Adults 60 years or older	The USPSTF recommends against initiating low-dose aspirin use for the primary prevention of CVD in adults 60 years or older.	D

https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/aspirin-to-prevent-cardiovascular-disease-preventive-medication

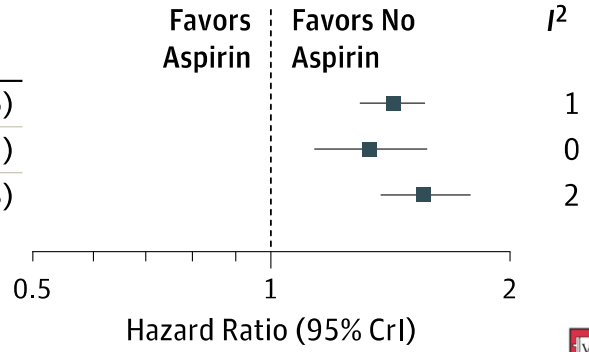
Aspirin for Primary Prevention

Figure 1. Cardiovascular and Bleeding Outcomes in All Participants

Cardiovascular Outcomes	No. of Studies	Aspirin		No Aspirin		Absolute Risk Reduction, % (95% CI)	HR (95% CrI)	I^2
		No. of Events	No. of Participants	No. of Events	No. of Participants			
CV death, MI, stroke	13	2911	79717	3342	80057	0.41 (0.23 to 0.59)	0.89 (0.84-0.94)	0
All-cause mortality	13	3622	81623	3588	80057	0.13 (-0.07 to 0.32)	0.94 (0.88-1.01)	0
CV mortality	13	995	81623	997	80057	0.07 (-0.04 to 0.17)	0.94 (0.83-1.05)	0
Myocardial infarction	13	1469	81623	1599	80057	0.28 (0.05 to 0.47)	0.85 (0.73-0.99)	0
Ischemic stroke	10	831	65316	942	63752	0.19 (0.06 to 0.30)	0.81 (0.76-0.87)	18



Bleeding Outcomes	No. of Studies	Aspirin		No Aspirin		Absolute Risk Increase, % (95% CI)	HR (95% CrI)	I^2
		No. of Events	No. of Participants	No. of Events	No. of Participants			
Major bleeding	11	1195	74715	834	73143	0.47 (0.34 to 0.62)	1.43 (1.30-1.56)	1
Intracranial bleeding	12	349	80985	257	79419	0.11 (0.04 to 0.18)	1.34 (1.14-1.57)	0
Major GI bleeding	10	593	70336	380	70465	0.30 (0.20 to 0.41)	1.56 (1.38-1.78)	2



CV death, MI, stroke ARR = 0.41

Major bleeding: ARI = 0.47

Zheng et al. *JAMA*. 2019;321(3):277-287. doi:10.1001/jama.2018.20578

Consider aspirin use among those

- Who are at elevated risk (≥20% 10-year risk) among whom the absolute CV benefit may be worth the risk of bleeding
- Who are at high risk for colorectal cancer
- Who are concerned about MI risk but less concerned about bleeding risk
- Among those who have a CAC score ≥ 100

CAC ≥ 100 as a guide to using aspirin in primary prevention

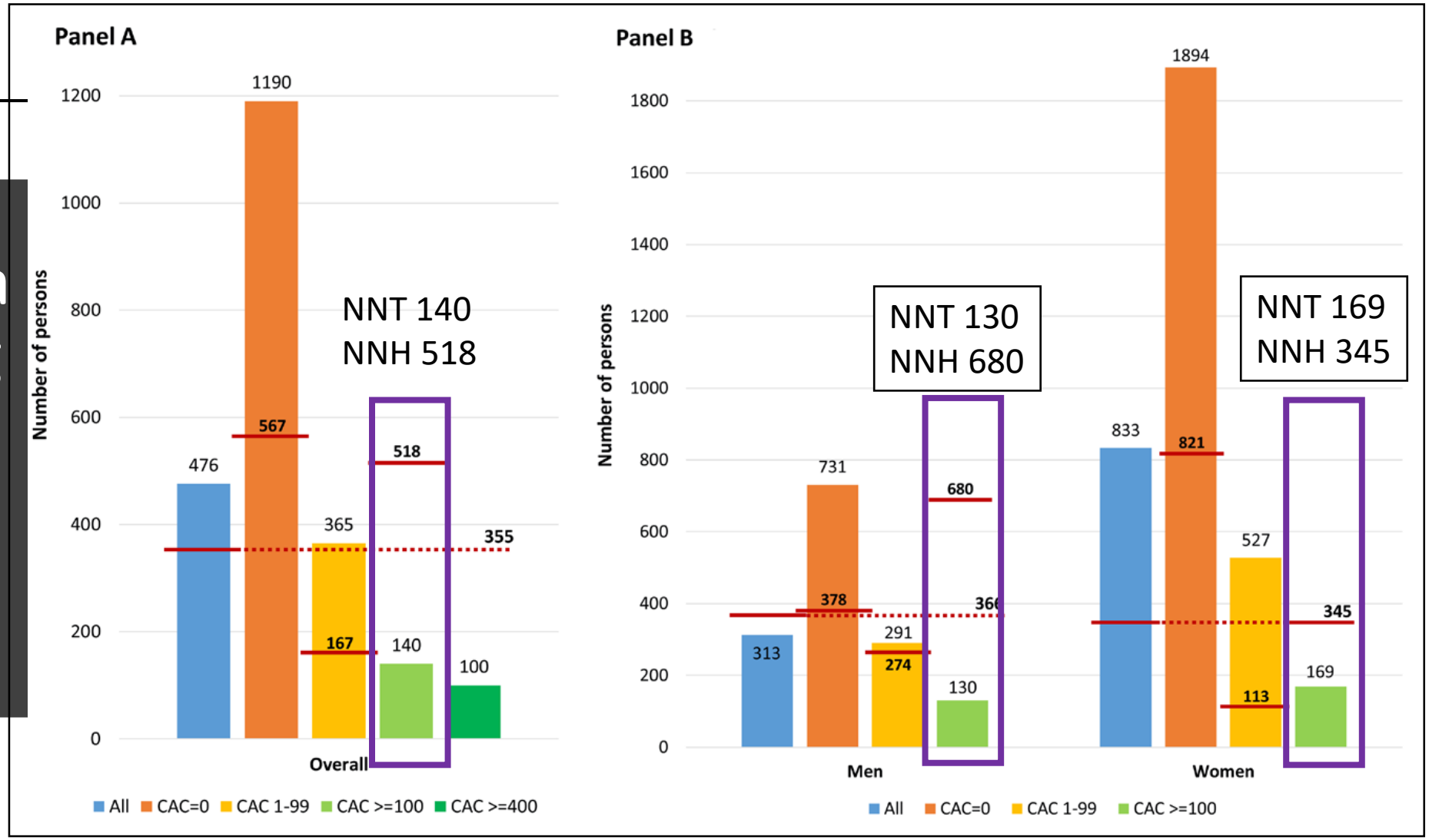


Figure 3. Number needed to treat with low-dose aspirin during 5 years to prevent 1 CVD event and number needed to cause a major bleeding event by baseline CAC score, overall (A) and by sex (B).

Values are presented as number of persons. Follow-up was censored at 5 years. Red horizontal lines represent NNH thresholds. Participants with CAC≥400 had zero bleeding events, and the NNH could not be computed. The exploratory NNT for participants with CAC≥400 was computed only overall. CAC indicates coronary artery calcium; CVD, cardiovascular disease; NNH, number needed to harm; and NNT, number needed to treat.

MESA Study. Circulation. 2020;141:1541–1553. DOI: 10.1161/CIRCULATIONAHA.119.045010

Conclusion

- Behaviors are an important tool to prevent cardiovascular disease but the evidence supporting specific diet recommendations is sparse, tends to be from observational studies, and subject to bias and confounding
- Diet, exercise, and weight loss are effective first line therapy for treating hypertension
- Risk prediction is a valuable tool but has important limitations and requires the use of clinical judgement
- Statins remain our most effective tool for preventing ASCVD events. Aspirin reduces the risk of CV events (particularly MI) but also increases the risk of bleeding. Patients who derive the most benefit are also those at the highest risk for adverse bleeding events.
- The treatment and prevention of cardiovascular, kidney, and metabolic conditions is among the most rapidly evolving and exciting spaces in medicine right now

BRIGHAM AND WOMEN'S HOSPITAL

| Heart & Vascular Center |

Thank you!

Brendan M. Everett, MD, MPH
beverett@bwh.harvard.edu

Associate Professor of Medicine
Harvard Medical School

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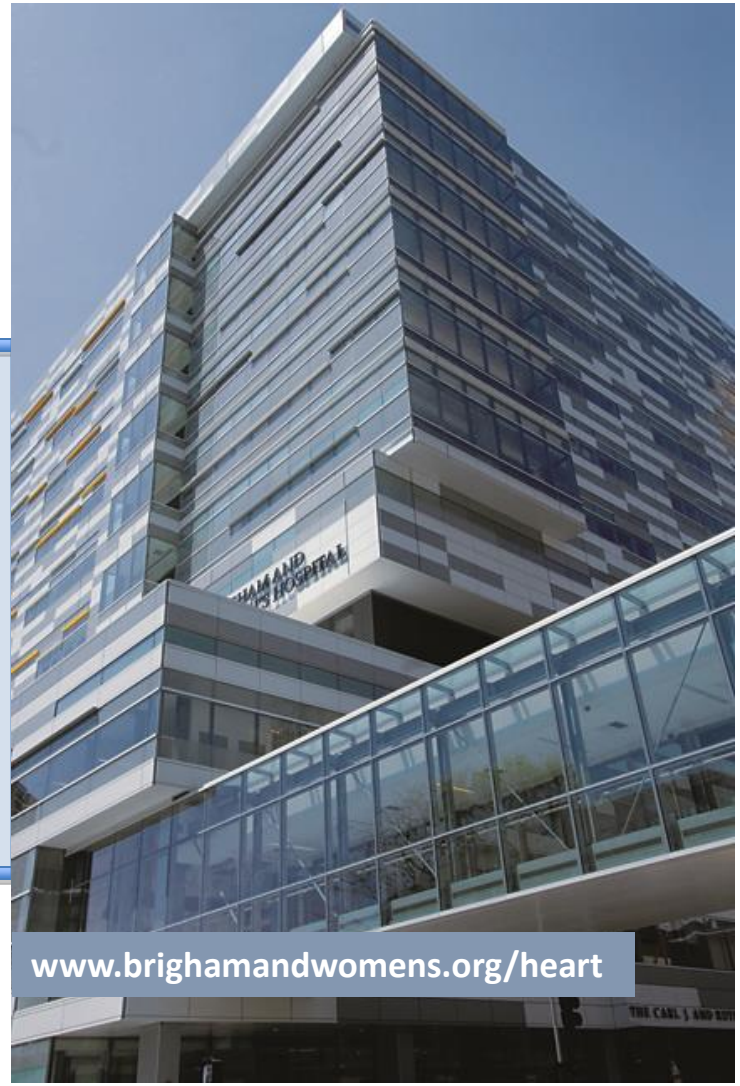

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- Pooled cohort equation calculator: https://tools.acc.org/ascvd-risk-estimator-plus/#!/calculate/estimate/
- PREVENT calculator: https://professional.heart.org/en/guidelines-and-statements/prevent-calculator
- SELECT Trial : N Engl J Med 2023;389:2221-32. DOI: 10.1056/NEJMoa2307563
- STEP-HFpEF Trial: N Engl J Med 2023;389:1069-84. DOI: 10.1056/NEJMoa2306963
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