58th Annual Carl J. Wiggers Memorial Lecture

Comprehensive Primary &Secondary Prevention of CVD

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No Disclosures

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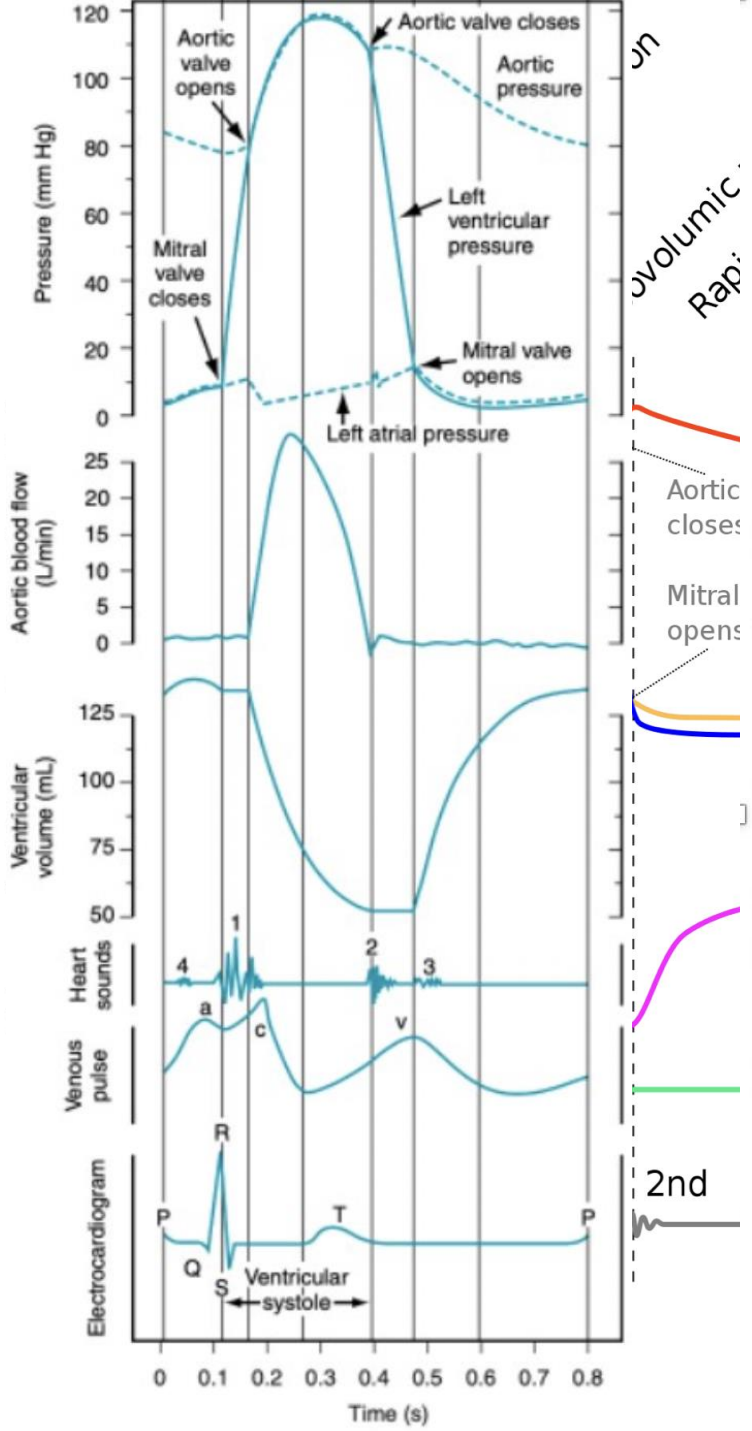

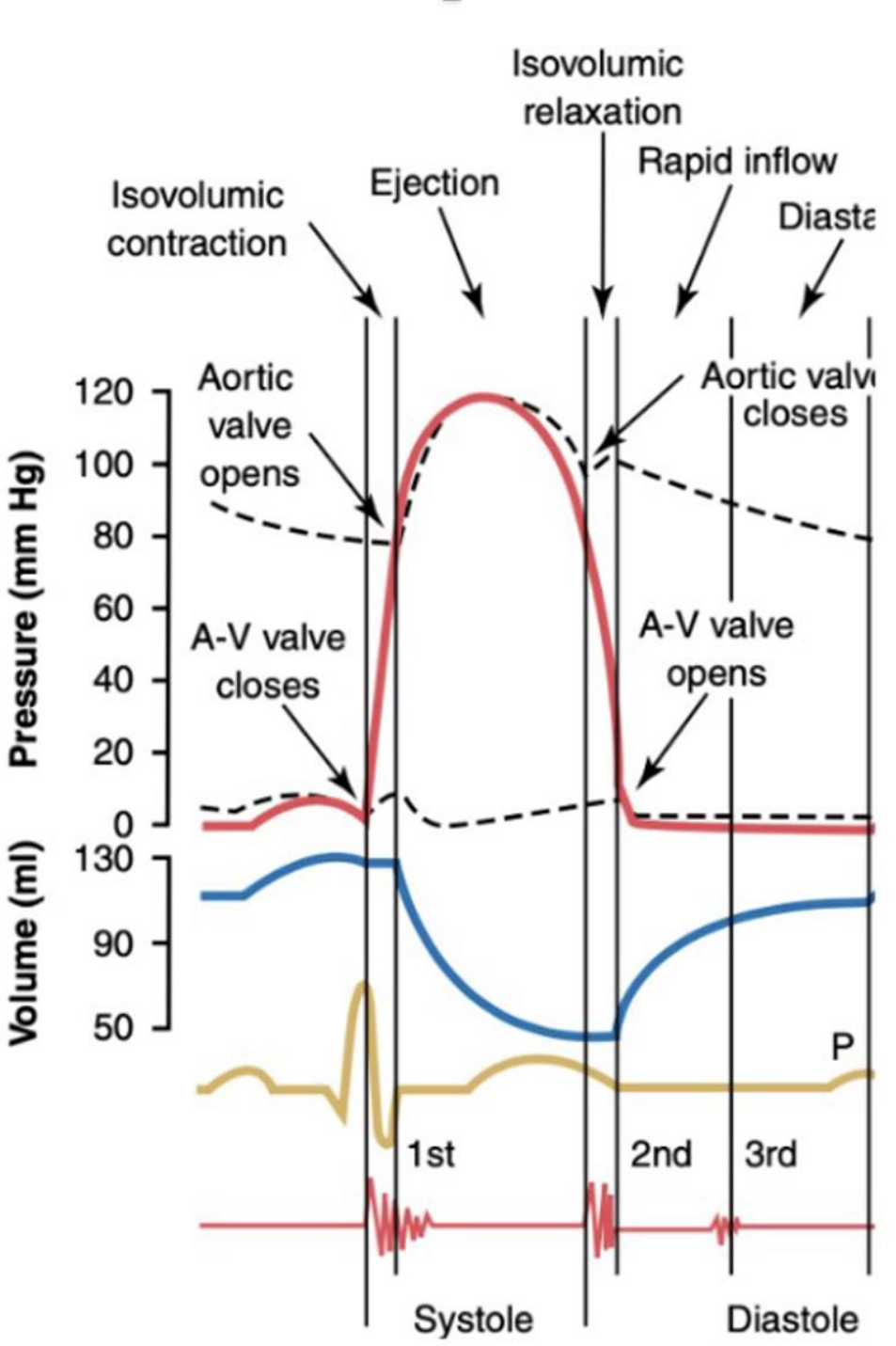

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The Answer

2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease

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Primary Prevention: Lifestyle Changes and Team-Based Care

DOI: 10.1016/j.jacc.2019.03.010

CARDIOLOGY

MARCH 2023

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VOL. 52 | NUMBER 3

THE TRIPLE WHAMMY:

OBESITY

DIABETES

SLEEP DISORDERED BREATHING

AND THEIR IMPACT ON CVD

AMERICAN COLLEGE of CARDIOLOGY

EARLY HIGHLIGHTS FROM ACC.23/WCC

Healthy Eating

Fitness

Quit Nicotine

Sleep

Losing Weight

Cholesterol

Diabetes

Blood Pressure

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Burden of CV Disease in the US

- Heart disease is the leading cause of death for men, women, and people of most racial and ethnic groups in the United States.
- One person dies every *36 seconds* in the United States from cardiovascular disease.
- About 655,000 Americans die from heart disease each year—that's *1 in every 4 deaths*.
- Heart disease costs the United States about *$219 billion each year* from 2014 to 2015. This includes the cost of health care services, medicines, and lost productivity due to death.
- *Over half of all black adults* have some form of CVD, 57% of women and 61% percent of men, with a 21% higher mortality rate.

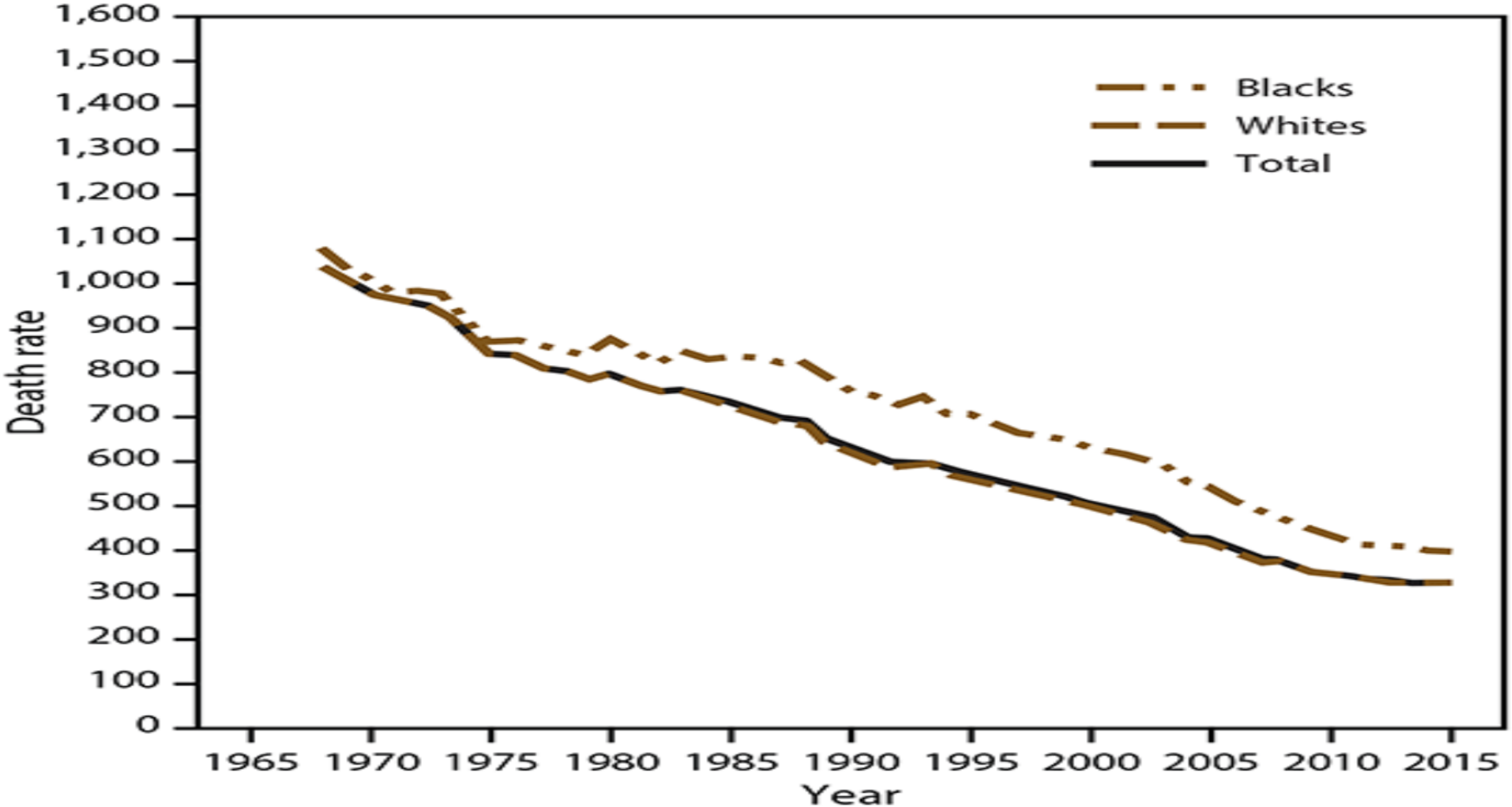
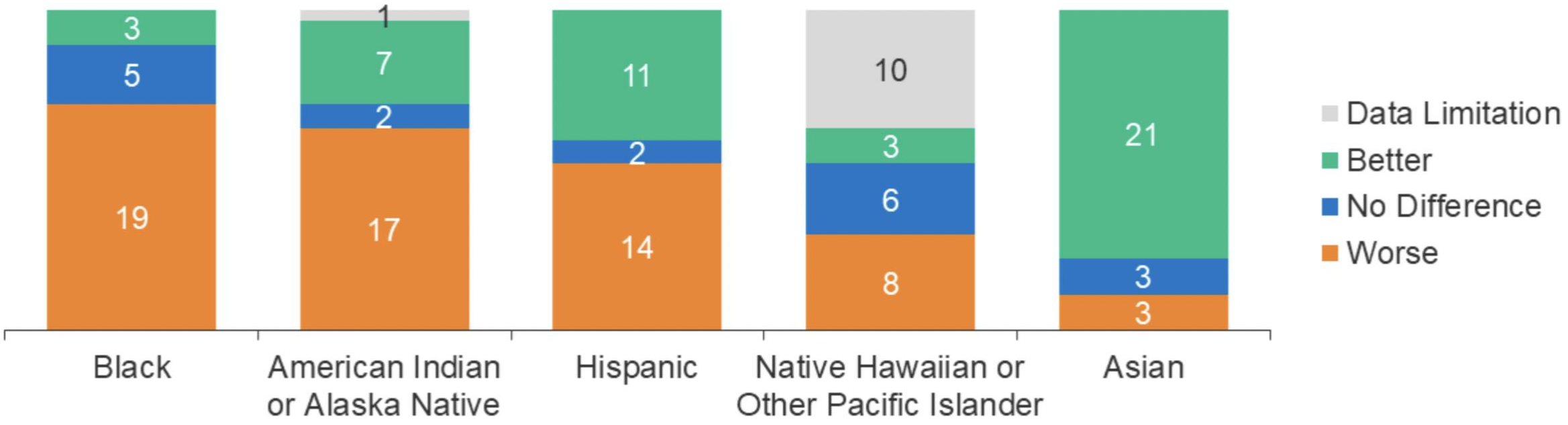


FIGURE 1. Heart disease death rates* and annual percentage changes among adults aged ≥35 years, by race — United States, 1968–2015

Figure 2

People of Color Fare Worse than their White Counterparts Across Many Measures of Health Status

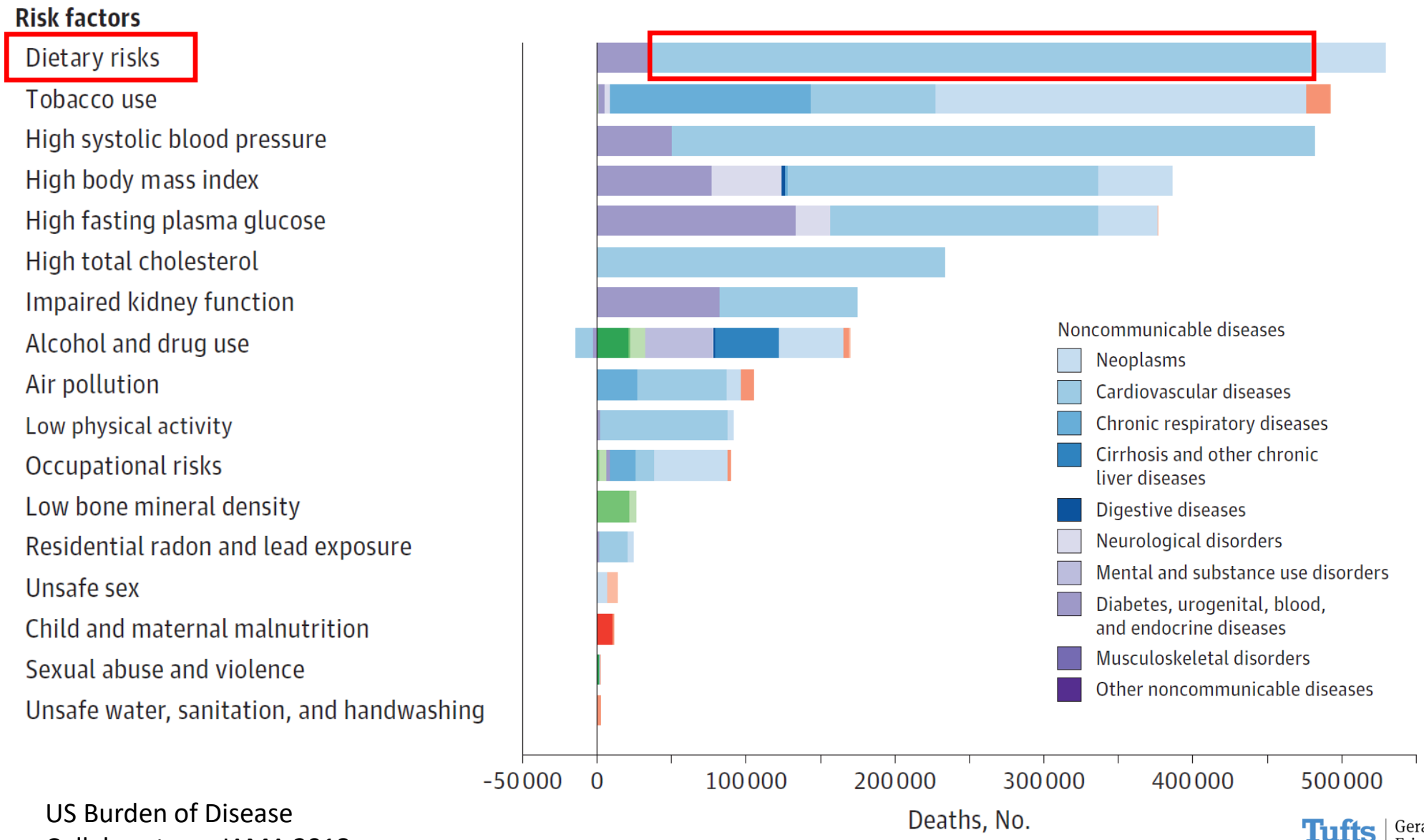
Number of health status measures for which group fared better, the same, or worse compared to White counterparts:



Note: Measures are for 2018 or the most recent year for which data are available. "Better" or "Worse" indicates a statistically significant difference from Whites at the $p<0.05$ level. No difference indicates no statistically significant difference. "Data limitation" indicates data are no separate data for a racial/ethnic group, insufficient data for a reliable estimate, or comparisons not possible due to overlapping samples. Persons of Hispanic origin may be of any race but are categorized as Hispanic for this analysis; other groups are non-Hispanic.

KFF

Our Food: The #1 Cause of Poor Health



US Burden of Disease Collaborators, JAMA 2018

Tufts University | Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy

Diet-Related Disease in the U.S.

- **More American adults are sick than are healthy:**
  - **1 in 2** have **diabetes or prediabetes**
  - **3 in 4** have **overweight or obesity**
  - Only **1 in 10** are **metabolically healthy**

- **Among American teenagers:**
  - **1 in 4** have **overweight or obesity**
  - **1 in 5** have **prediabetes**
  - **1 in 8** have **severe fatty liver disease**

Centers for Medicare & Medicaid Services, 2018
American Heart Association, *Heart Disease and Stroke Statistics,* 2018
The Milken Institute, *America's Obesity Crisis*, 2018

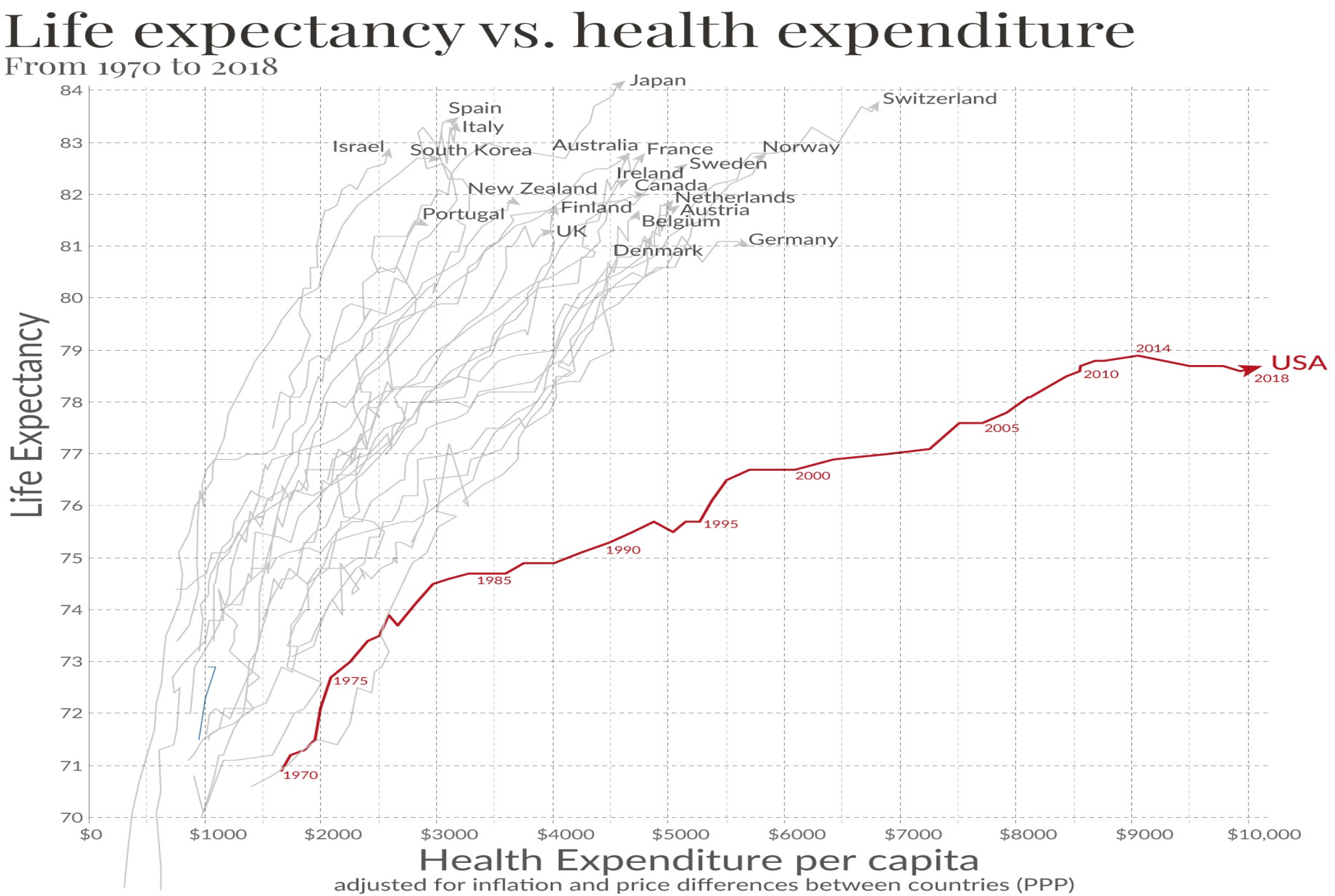
Crushing Economic Costs

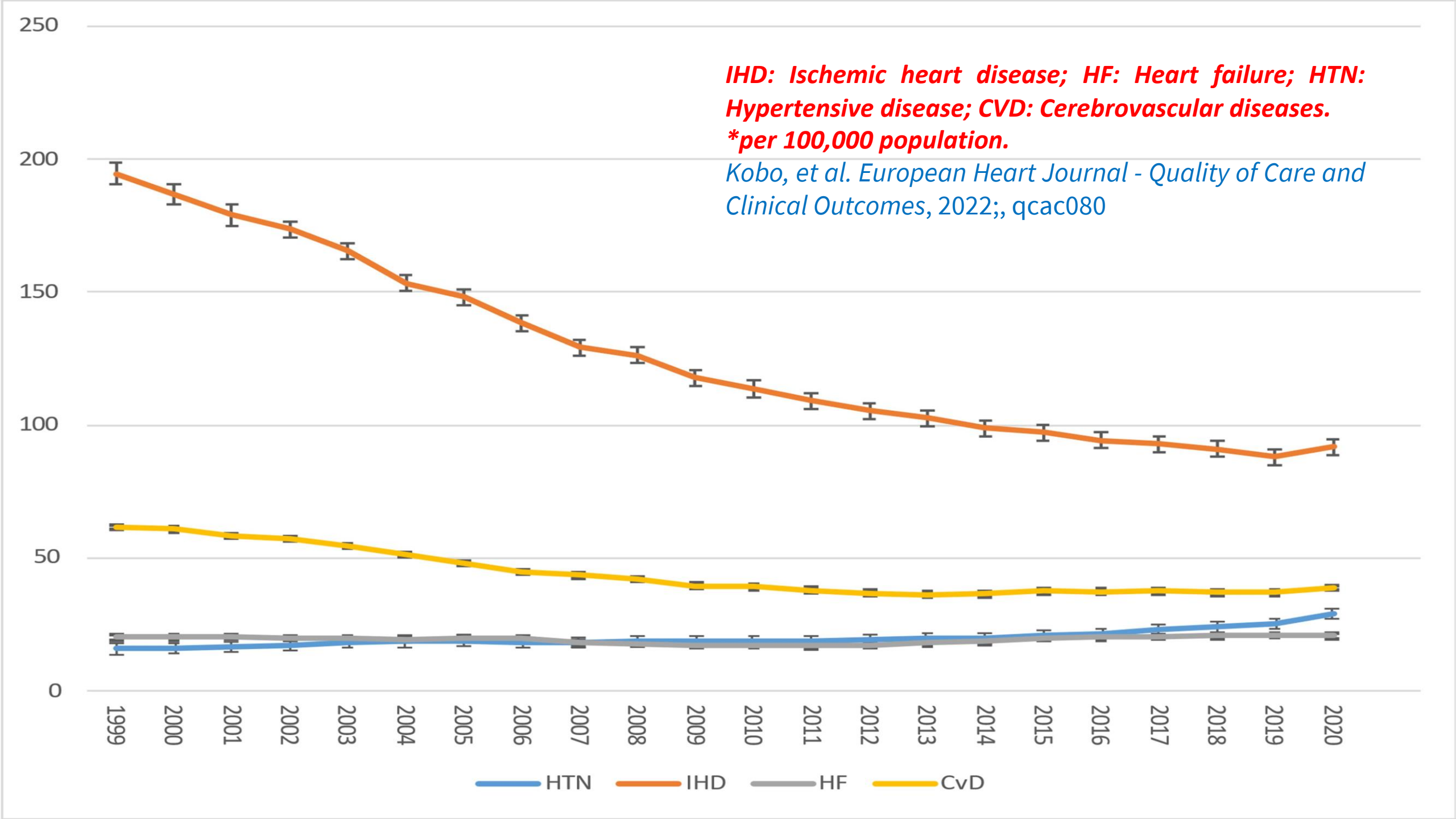
- In 50 years, healthcare costs have skyrocketed from :
  - **7%** to **18%** of U.S. Gross Domestic Product (GDP)
  - **1 in 20** to nearly **1 in 3** dollars in the federal budget and average state budgets
  - **$80 billion** to **$1.2 trillion** for US businesses
  - **>11,000/year** per man, woman, and child in the US

- **80% of healthcare dollars** are spent on preventable chronic diseases

- The US government spends **$160 billion** on direct medical costs for **diabetes alone**

Centers for Medicare & Medicaid Services, 2018
American Heart Association, *Heart Disease and Stroke Statistics,* 2018
The Milken Institute, *America's Obesity Crisis*, 2018


Life expectancy vs. health expenditure
From 1970 to 2018
Japan
Switzerland
Spain
Italy
Israel
South Korea
Australia
France
Norway
Sweden
Ireland
Canada
New Zealand
Netherlands
Finland
Portugal
Austria
Belgium
UK
Germany
Denmark
USA
1970
1975
1985
1990
1995
2000
2005
2010
2014
2018
Life Expectancy
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
$0
$1000
$2000
$3000
$4000
$5000
$6000
$7000
$8000
$9000
$10,000
Health Expenditure per capita
adjusted for inflation and price differences between countries (PPP)



IHD: Ischemic heart disease; HF: Heart failure; HTN: Hypertensive disease; CVD: Cerebrovascular diseases.
****per 100,000 population.***

Kobo, et al. European Heart Journal - Quality of Care and Clinical Outcomes, 2022;, qcac080

"We are too busy mopping the floor to turn off the faucet."

Journal of the American College of Cardiology

Cardiovascular Disease Projections in the United States Based on the 2020 Census Estimates

Original Investigation

Reza Mohebi, Chen Chen, Nasrien E. Ibrahim, Cian P. McCarthy, Hanna K. Gaggin, Daniel E. Singer, Emily P. Hyle, Jason H. Wasfy, and James L. Januzzi

J Am Coll Cardiol. 2022 Aug, 80 (6) 565–578

Editorial Comment: Worsening Cardiovascular Disease Epidemiology in the United States: The Time for Preparation Is Now*

SECTIONS | FULL TEXT | ABSTRACT | PDF

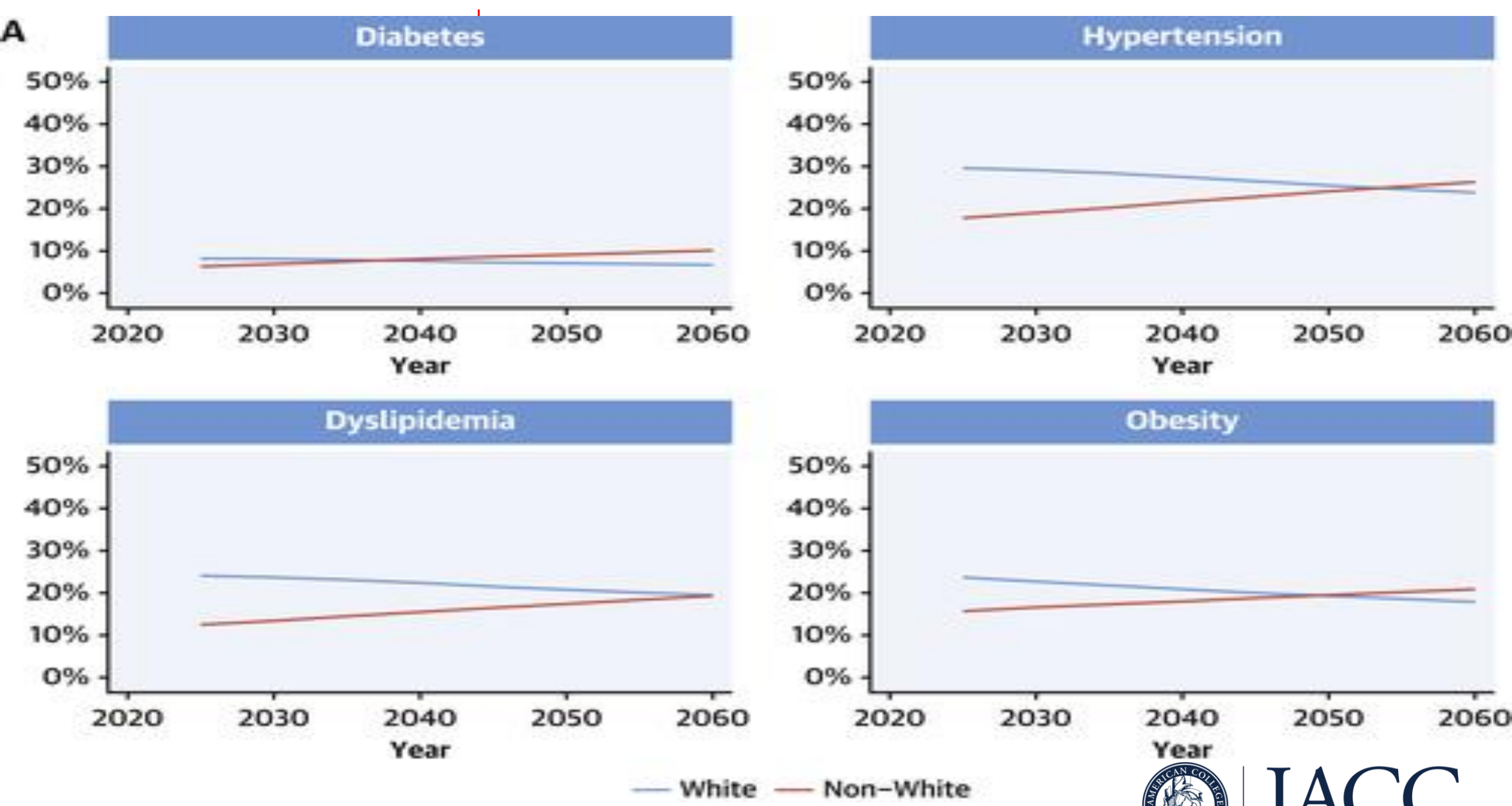
Increases in 2060 vs. 2025:

- Diabetes mellitus: 39%
- Hypertension: 27%
- Dyslipidemia: 28%
- Obesity: 18%

Resulting in increased:

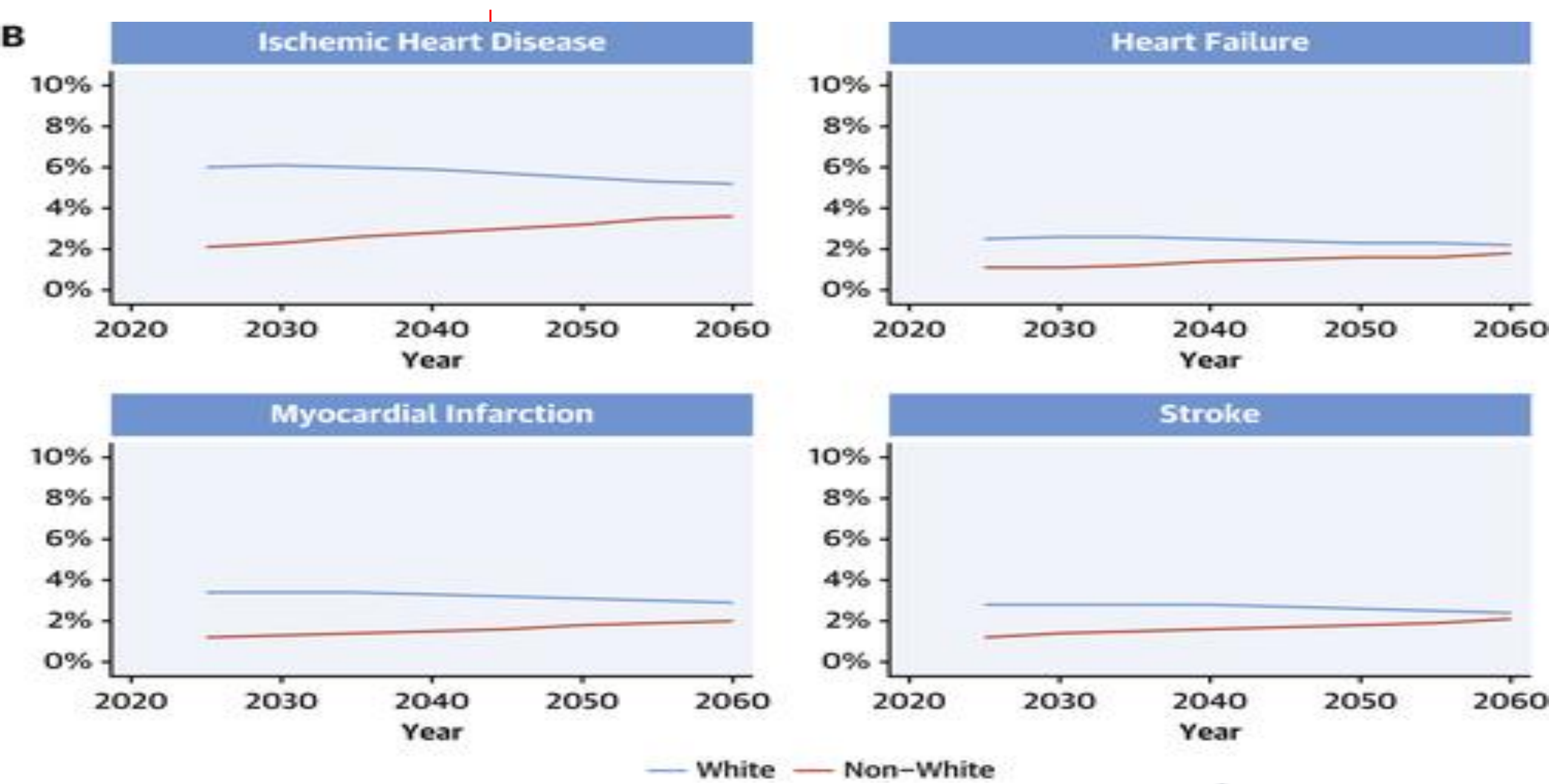
- Ischemic heart disease: 31%
- Heart failure: 33%
- Myocardial infarction: 30%
- Stroke: 34%

All will decrease in Whites, but will increase in racial minorities.



Andreas P. Kalogeropoulos et al. *J Am Coll Cardiol* 2022; 80:579-583.

JACC
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY



Andreas P. Kalogeropoulos et al. *J Am Coll Cardiol* 2022; 80:579-583.

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The Time is Now

Conclusions:

Large future increases in CV risk factors and CV disease prevalence are projected, disproportionately affecting racial and ethnic minorities. Future health policies and public health efforts should take these results into account to provide quality, affordable, and accessible health care.

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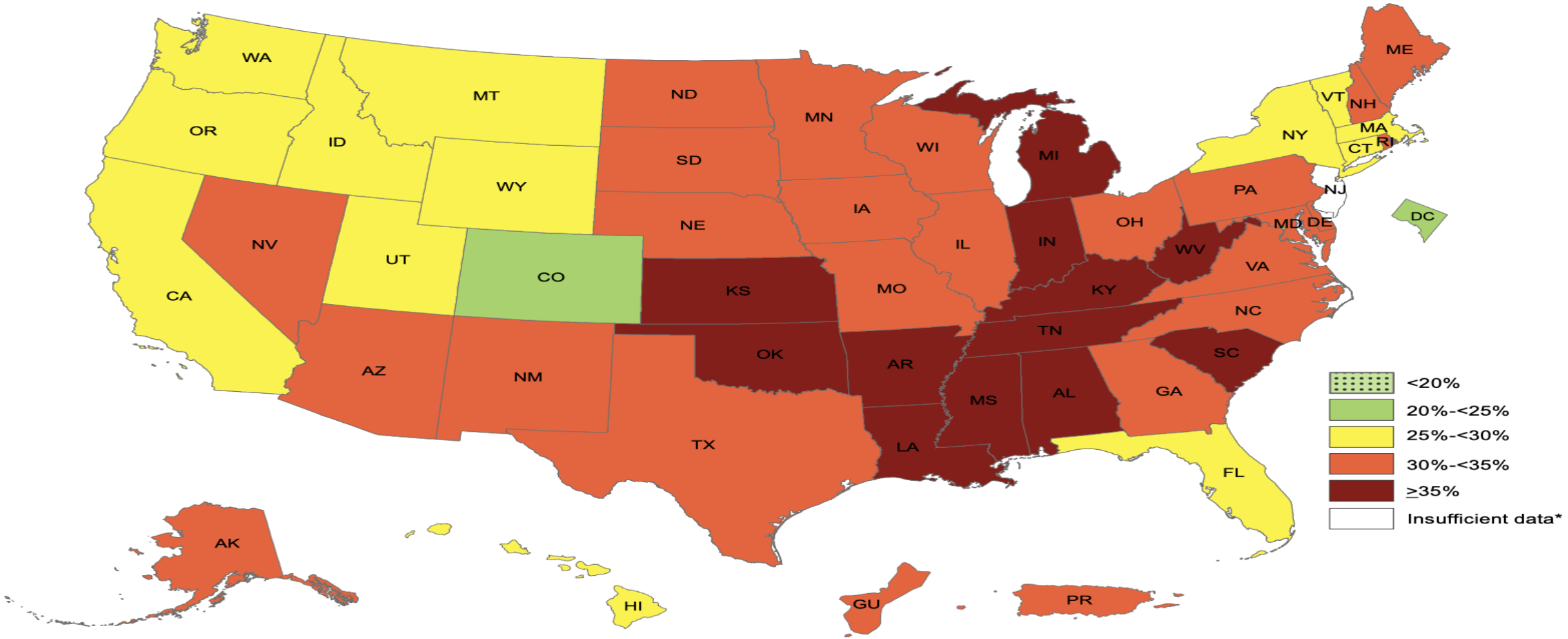
- . . . survey looked only at "any" consumption of produce
- . . . federal government's Dietary Guidelines for Americans call for adults to eat about 2 to 3 cups of vegetables per day.
- . . . research has shown that 90% of Americans do not meet that goal

February 5, 2021

Many U.S. Adults Aren't Getting Healthy Amounts of Fruits, Vegetables

Prevalence† of Self–Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2019

†Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

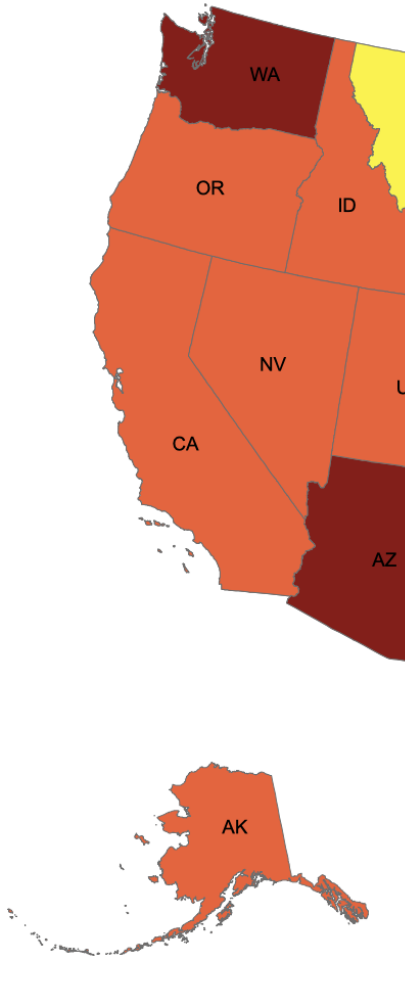


Non-Hispanic White

Prevalence of Self-Report
2017-2019

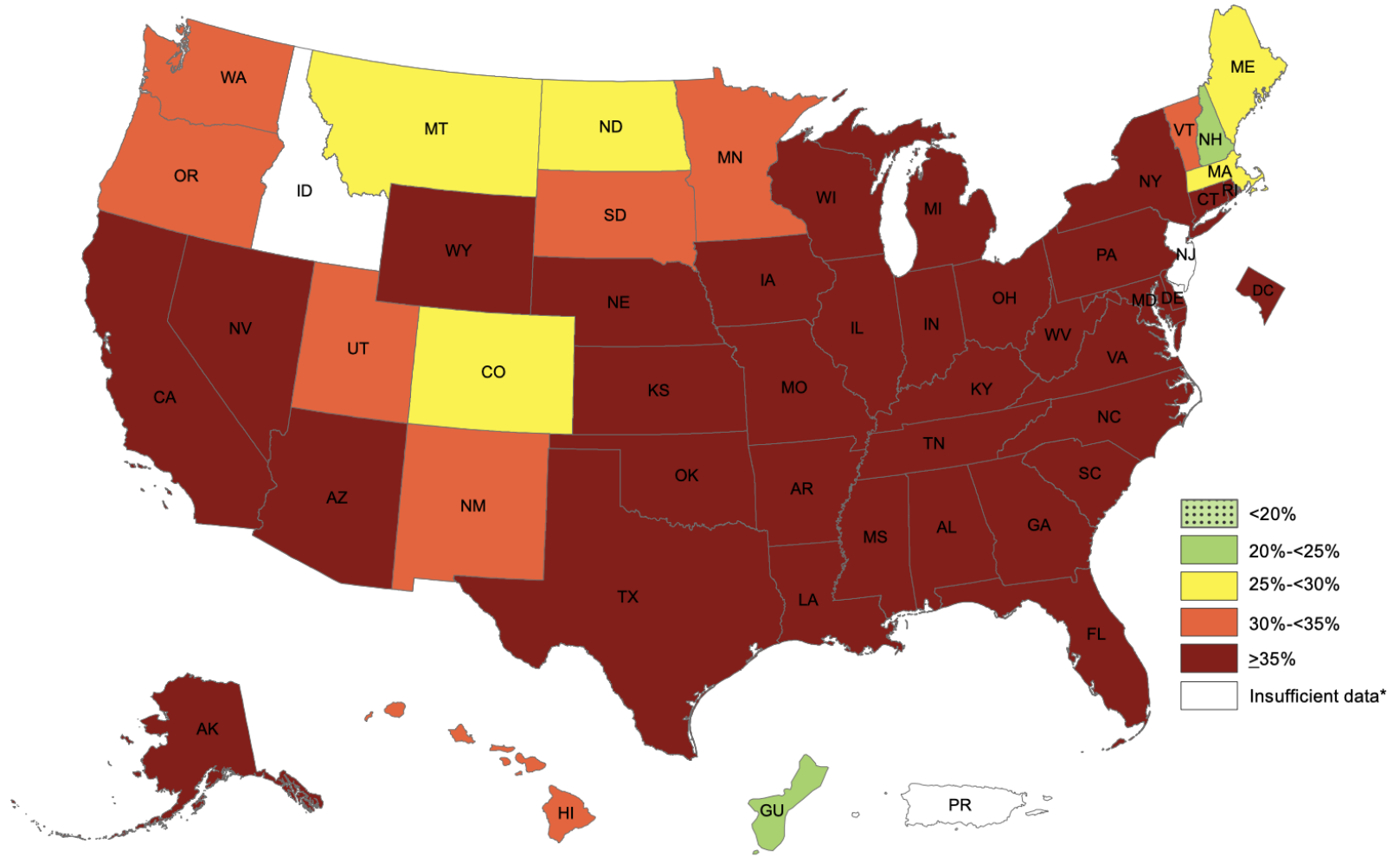
Hispanic Adults

Prevalence of Self-Reporte

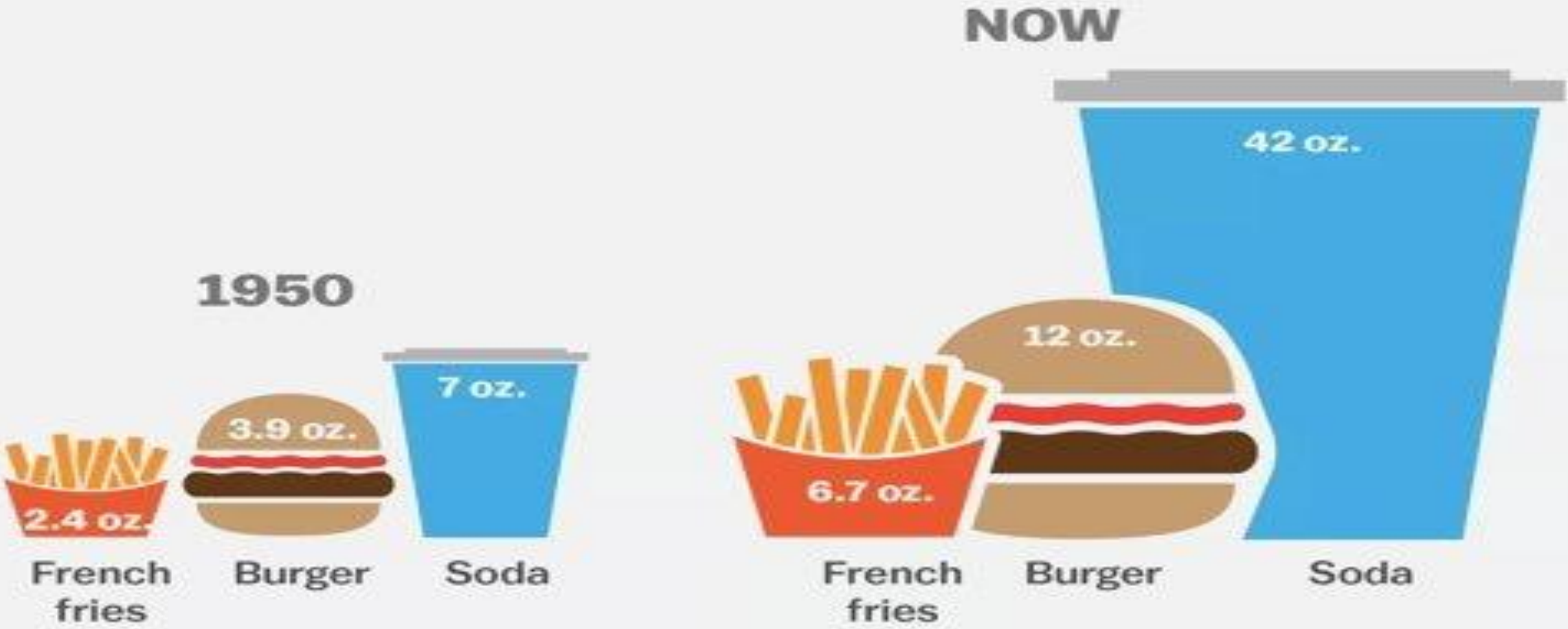


Non-Hispanic Black Adults

Prevalence of Self-Reported Obesity Among Non-Hispanic Black Adults by State and Territory, BRFSS, 2017-2019



The average restaurant meal today is more than four times larger than in the 1950s



SOURCE: CDC

Vox

Obesity is Increasing Worldwide

Global overweight and obesity

The estimates for global levels of overweight and obesity (BMI ≥25kg/m²), also referred to as high BMI throughout this Atlas, suggest that over 4 billion people may be affected by 2035, compared with over 2.6 billion in 2020. This reflects an increase from 38% of the world's population in 2020 to over 50% by 2035 (figures exclude children under 5 years old).

The prevalence of obesity (BMI ≥30kg/m²) alone is anticipated to rise from 14% to 24% of the population over the same period, affecting nearly 2 billion adults, children and adolescents by 2035.

https://s3-eu-west-1.amazonaws.com/wof-files/World_Obesity_Atlas_2023_Report.pdf

Circulation

Epidemiology and Prevention

Southern Dietary Pattern Is Associated With Hazard of Acute Coronary Heart Disease in the Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study

James M. Shikany, DrPH; Monika M. Safford, MD; P. K. Newby, ScD, MPH, MS; Raegan W. Durant, MD; Todd M. Brown, MD; Suzanne E. Judd, PhD

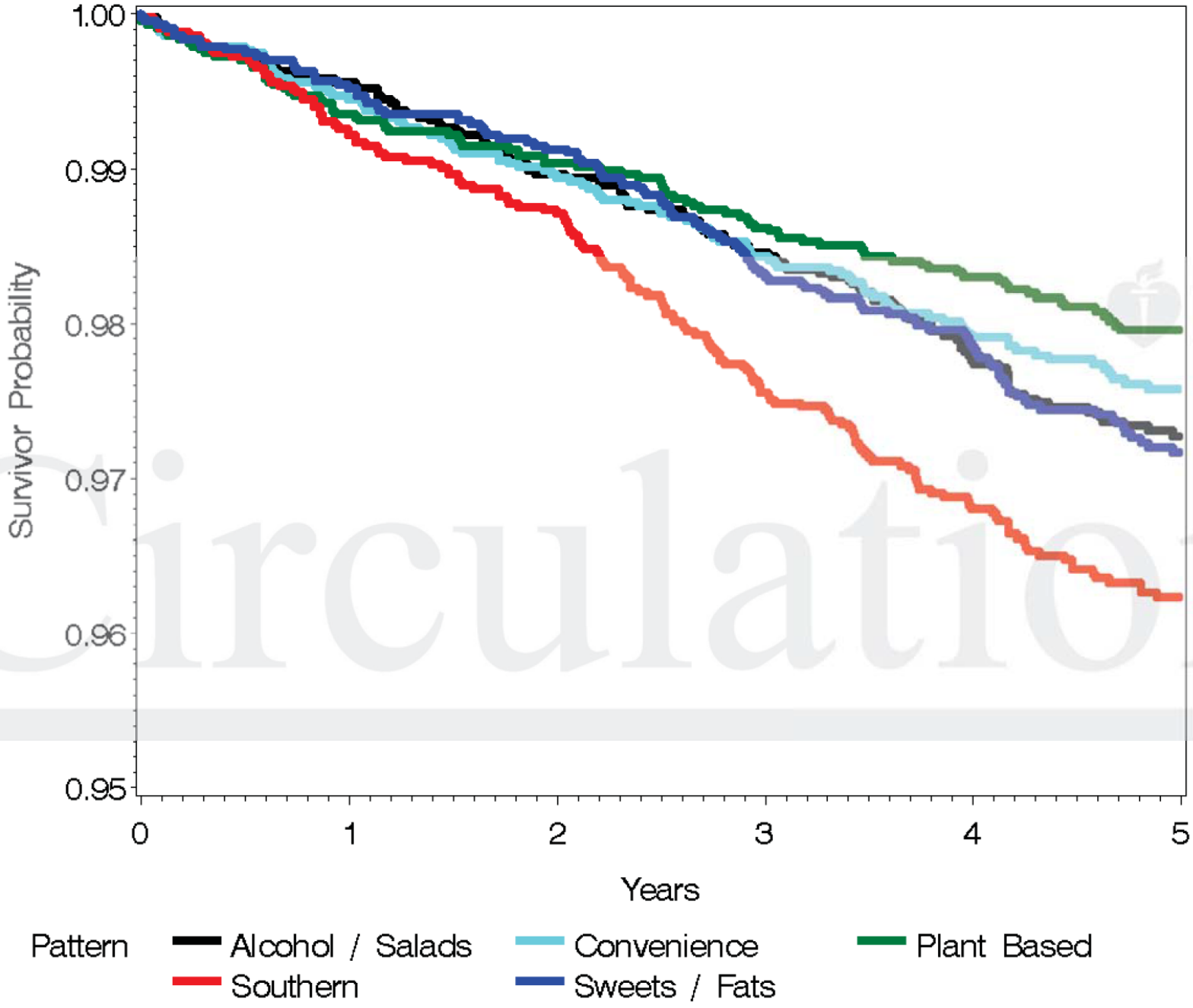
+ Author Affiliations

Correspondence to James M. Shikany, DrPH, Division of Preventive Medicine, University of Alabama at Birmingham, 1720 2nd Ave S, MT 619, Birmingham, AL 35294-4410. E-mail jshikany@uabmc.edu

Abstract

Background—The association of overall diet, as characterized by dietary patterns, with risk of incident acute coronary heart disease (CHD) has not been studied extensively in samples including sociodemographic and regional diversity.

Methods and Results—We used data from 17418 participants in Reasons for Geographic and Racial Differences in Stroke (REGARDS), a national, population-based, longitudinal study of white and black adults aged ≥45 years, enrolled from 2003 to 2007. We derived dietary patterns with factor analysis and used Cox proportional hazards regression to examine hazard of incident acute CHD events – nonfatal myocardial infarction and acute CHD death – associated with quartiles of consumption of each pattern, adjusted for various levels of covariates. Five primary dietary patterns emerged: Convenience, Plant-based, Sweets, Southern, and Alcohol and Salad. A total of 536 acute CHD events occurred over a median (interquartile range) 5.8 (2.1) years of follow-up. After adjustment for sociodemographics, lifestyle factors, and energy intake, highest consumers of the Southern pattern (characterized by added fats, fried food, eggs, organ and processed meats, and sugar-sweetened beverages) experienced a 56% higher hazard of acute CHD (comparing quartile 4 with quartile 1: hazard ratio, 1.56; 95% confidence interval, 1.17–2.08; *P* for trend across quartiles=0.003). Adding anthropometric and medical history variables to the model attenuated the association somewhat (hazard ratio, 1.37; 95% confidence interval, 1.01–1.85; *P*=0.036).



EATING A SOUTHERN DIET

substantially increases health risks

56%* HIGHER **RISK**

of heart disease

50%* INCREASE **IN RISK**

of death in patients with kidney disease

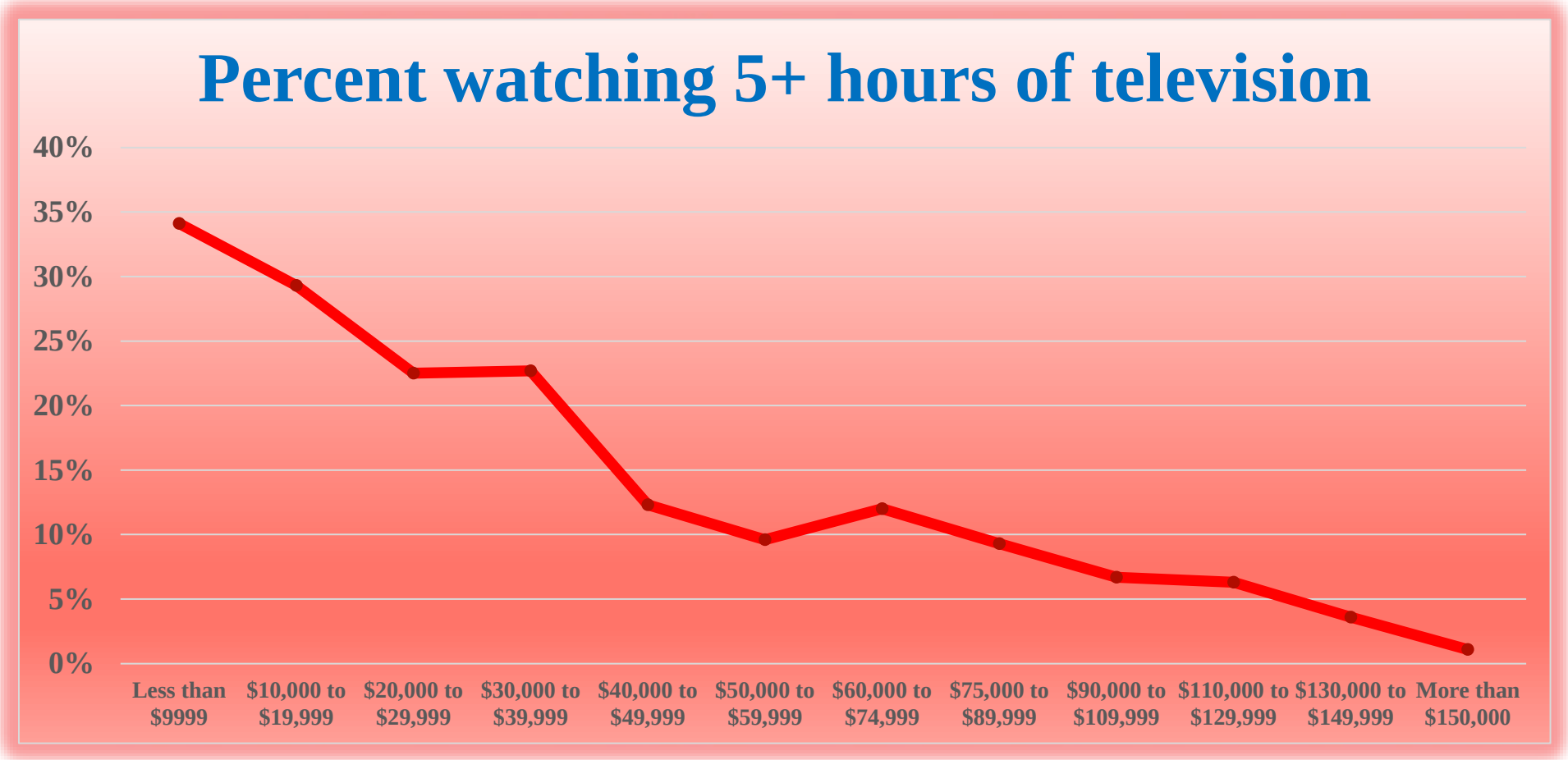
30%* HIGHER **RISK**

of stroke

UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

*Compared with those who eat a Southern diet less frequently

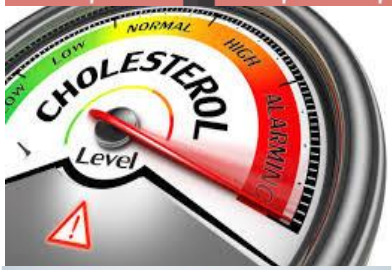
Study: Poverty and High Rates of TV Viewing Are Linked



A study conducted by the General Social Surveys of NORAC at the University of Chicago found that 34.1 percent of American families making less than $9,000 per year averaged watching more than five hours of television per day. Of families making more than $150,000 per year, only 1.1 percent watched more than five hours a day.

Risk Factors and Nutrition

- Obesity
- Diabetes
- Hypertension
- Hyperlipidemia
- Inflammation



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Obesity and Dietary Intervention

Table 4. Changes in Weight and Cardiac Risk Factors in an Analysis in Which Missing Values Were Excluded*

Variable	Diet Group, Mean Change (SD)			
	Atkins (n = 40)	Zone (n = 40)	Weight Watchers (n = 40)	Ornish (n = 40)
Weight, kg				
2 mo	–4.7 (2.9)†	–4.6 (3.4)†	–4.2 (3.8)†	–5.0 (3.0)†
6 mo	–5.8 (5.3)†	–5.2 (6.4)†	–4.7 (6.1)†	–6.7 (8.0)†
12 mo	–3.9 (6.0)†	–4.9 (6.9)†	–4.6 (5.4)†	–6.6 (9.3)†

Dansinger ML, Gleason JA, Griffith JL, Selker HP, Schaefer EJ. Comparison of the Atkins, Ornish, Weight Watchers, and Zone diets for weight loss and heart disease risk reduction: a randomized trial. JAMA. 2005;293:43-53.

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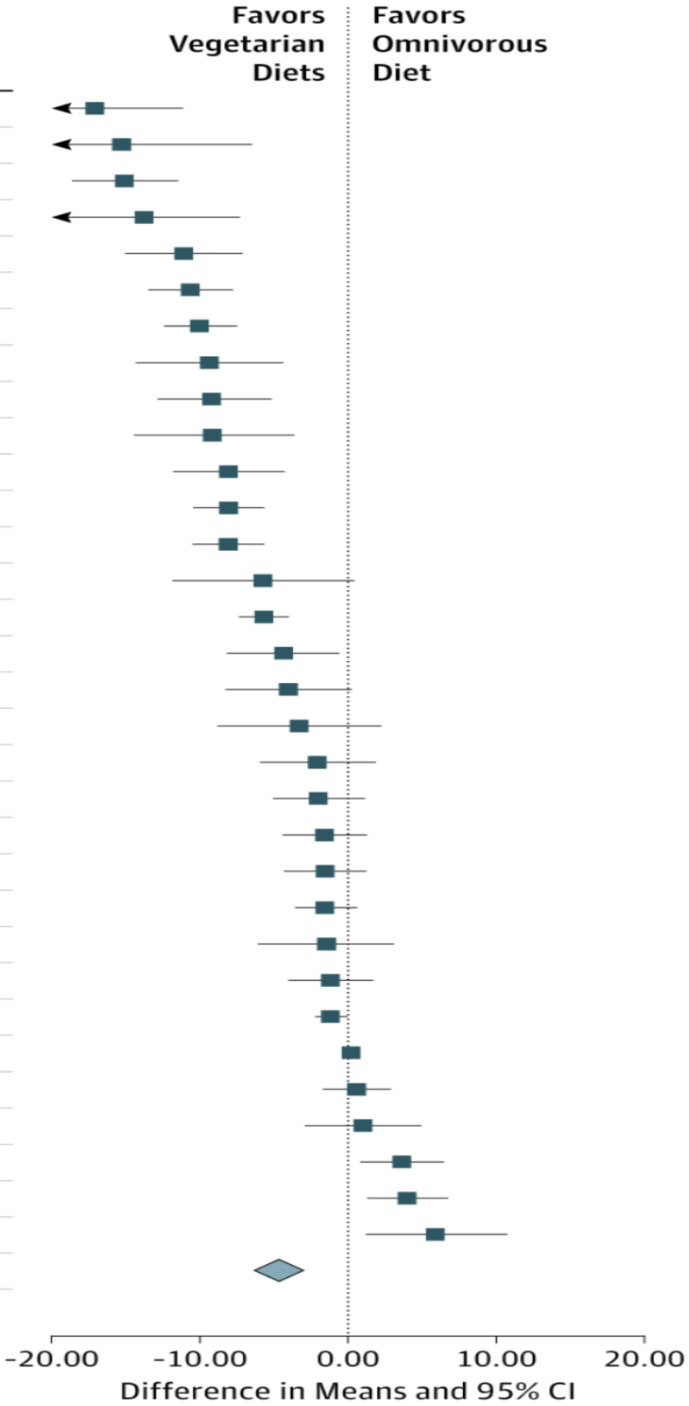
Original Investigation

Vegetarian Diets and Blood Pressure
A Meta-analysis

Yoko Yokoyama, PhD, MPH; Kunihiro Nishimura, MD, PhD, MPH; Neal D. Barnard, MD; Misa Takegami, RN, PhD, MPH; Makoto Watanabe, MD, PhD; Akira Sekikawa, MD, PhD; Tomonori Okamura, MD, PhD; Yoshihiro Miyamoto, MD, PhD

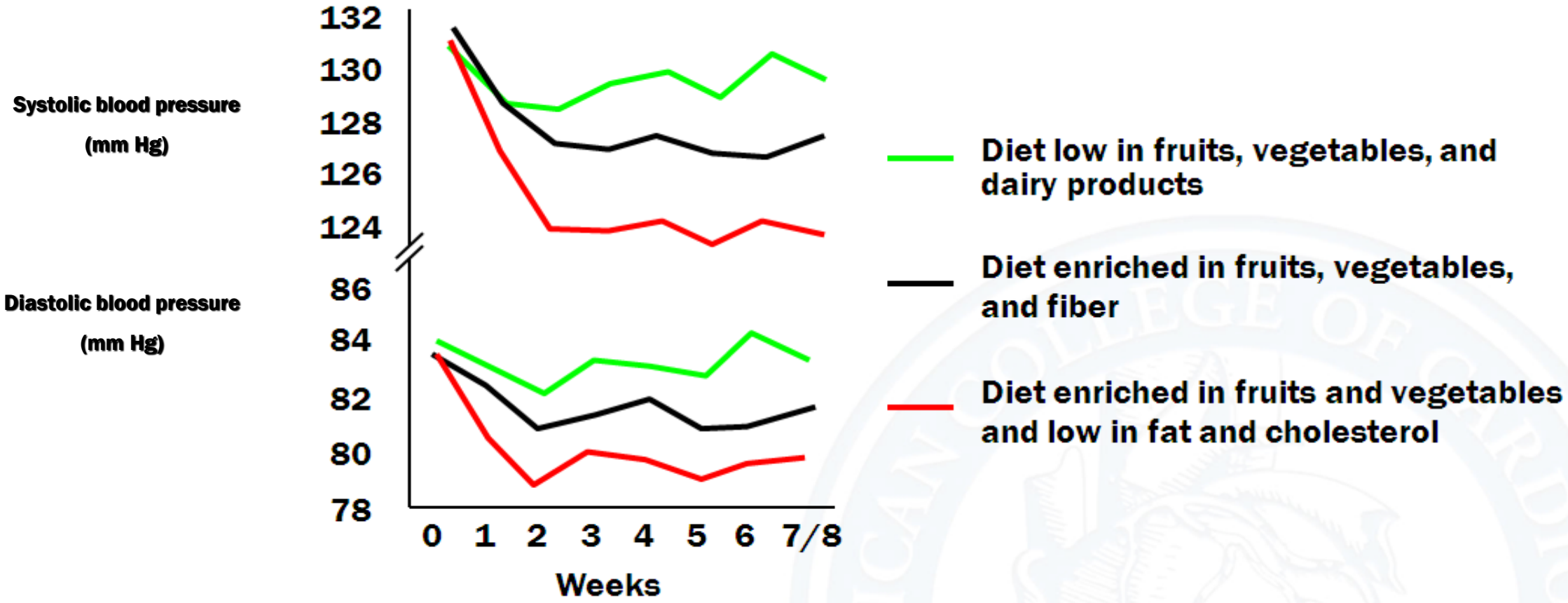
Source	Subgroup Within Study	Comparison	Statistics for Each Study: Difference in Mean	Lower Limit	Upper Limit	*P* Value
Fontana et al,[27] 2007	Vegan	Omnivorous	−17.0	−22.8	−11.2	<.001
Orlov et al,[39] 1994	Vegan	Omnivorous	−15.2	−23.9	−6.5	.001
Teixeira et al,[28] 2007	Mixed	Omnivorous	−15.0	−18.5	−11.5	<.001
Rodenas et al,[21] 2011	Mixed, women	Omnivorous	−13.7	−20.1	−7.3	<.001
Nakamoto et al,[25] 2008	Combined	Omnivorous	−11.0	−14.9	−7.1	<.001
Ophir et al,[43] 1983	Lacto-ovo	Omnivorous	−10.6	−13.4	−7.8	<.001
Slavícek et al,[26] 2008	Lacto-ovo	Omnivorous	−9.9	−12.3	−7.5	<.001
Kim and Bae,[16] 2012	Lacto-ovo, women	Omnivorous	−9.3	−14.3	−4.3	<.001
Wiseman et al,[42] 1987	Mixed	Omnivorous	−9.0	−12.8	−5.2	<.001
Wyatt et al,[37] 1995	Lacto-ovo	Omnivorous	−9.0	−14.3	−3.7	.001
Haines et al,[46] 1980	Combined	Omnivorous	−8.0	−11.7	−4.3	<.001
Yang et al,[22] 2011	Lacto-ovo, men	Omnivorous	−8.0	−10.3	−5.7	<.001
Yang et al,[18] 2012	Lacto, men	Omnivorous	−8.0	−10.3	−5.6	<.001
Harman et al,[35] 1998	Combined	Omnivorous	−5.7	−11.7	0.4	.07
Pettersen et al,[17] 2012	Mixed	Omnivorous	−5.6	−7.2	−4.0	<.001
Lu et al,[33] 2000	Combined	Omnivorous	−4.3	−8.0	−0.6	.02
Fernandes Dourado et al,[20] 2011	Lacto-ovo	Omnivorous	−4.0	−8.1	0.2	.06
Goff et al,[31] 2005	Vegan	Omnivorous	−3.2	−8.7	2.3	.25
Armstrong et al,[47] 1979	Lacto-ovo	Omnivorous	−2.0	−5.9	1.9	.31
Su et al,[30] 2006	Mixed, women	Omnivorous	−1.9	−4.9	1.1	.22
Sebeková et al,[29] 2006	Lacto-ovo	Omnivorous	−1.5	−4.2	1.2	.28
Rouse et al,[44] 1983	Combined	Omnivorous	−1.5	−4.2	1.2	.28
Melby et al,[40] 1989	Combined	Omnivorous	−1.4	−3.4	0.6	.16
Pitla and Nagalla,[24] 2009	Combined	Omnivorous	−1.4	−5.9	3.1	.54
Melby et al,[38] 1994	Mixed	Omnivorous	−1.1	−3.9	1.7	.45
Williams et al,[36] 1997	Combined	Omnivorous	−1.1	−2.1	−0.1	.03
Appleby et al,[32] 2002	Combined	Omnivorous	0.3	−0.3	0.9	.36
Chen et al,[19] 2011	Lacto-ovo, women	Omnivorous	0.7	−1.6	2.9	.56
Burr et al,[45] 1981	Combined	Omnivorous	1.1	−2.8	5.0	.58
Lin et al,[23] 2010	Vegan, women	Omnivorous	3.7	0.9	6.5	.009
Famodu et al,[34] 1998	Mixed	Omnivorous	4.1	1.4	6.8	.003
Sanders and Key,[41] 1987	Combined	Omnivorous	6.0	1.3	10.7	.01
Total			**−4.7**	**−6.3**	**−3.1**	<.001



Diet Evidence: Effect on Blood Pressure

Dietary Approaches to Stop Hypertension (DASH) Group

459 hypertensive patients randomized to 1 of 3 diets for 8 weeks

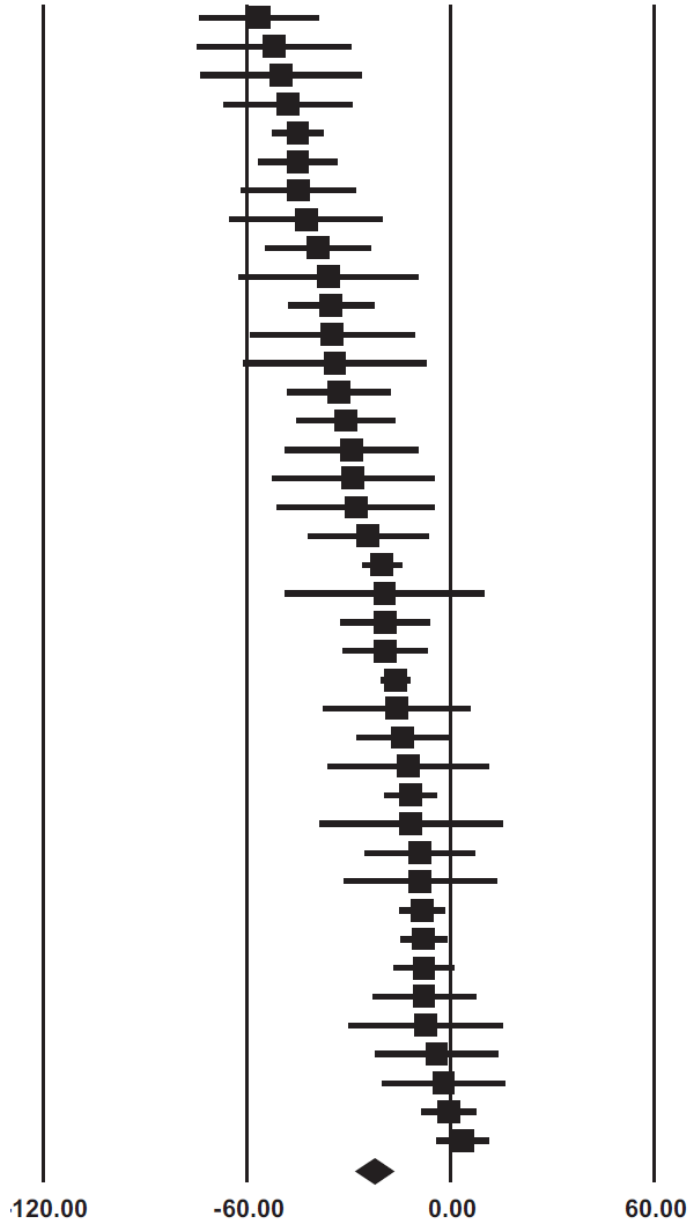


A diversified diet improves blood pressure

Appel LJ et al. *NEJM* 1997;336:1117-24

B

Study name	Subgroup within study
Fernandes Dourado et al., 2011 (26)	Lacto-ovo
Burslem et al., 1978 (11), 30-40 yr male	Vegan
Sanders & Roshanai, 1992 (29) , male	Vegan
Lu et al., 2000 (16), female	Vegan/Lacto
Sacks et al., 1975 (10)	Pesco
Teixeira et al., 2007 (14)	Lacto-ovo/ Vegan/ Pesco/ Lacto
Lu et al., 2000, male (16)	Vegan/Lacto
Roshanai & Sanders, 1984 (24), male	Vegan
Burslem et al., 1978 (11), 20-30 yr male	Vegan
Nestel et al., 1981 (37)	Lacto-ovo
Krajcovicova-Kudlackova et al., 1994 (34), female	Lacto-ovo/Lacto
Knuiman & West, 1982 (23)	Vegan
Burslem et al., 1978 (11), 30-40 yr female	Vegan
Burslem et al., 1978 (11), 20-30 yr female	Vegan
Krajcovicova-Kudlackova et al., 1994 (34), male	Lacto-ovo/Lacto
Richter et al., 1999 (28), female	Lacto-ovo
Nieman et al., 1989 (30)	Lacto-ovo
Richter et al., 1999 (28), male	Lacto-ovo
Fu et al., 2008 (17)	Lacto-ovo
Yang et al., 2011 (19)	Lacto-ovo
Harman & Parnell, 1998 (13), female	Lacto/Vegan
Kim et al., 2012 (18)	Vegan/Lacto-ovo
Fisher et al., 1986 (12)	Vegan/Lacto-ovo
Chiang et al., 2013 (22)	Lacto-ovo/lacto/Ovo/Vegan
Gojda et al., 2013 (38)	Vegan
Li et al., 1999 (25)	Lacto-ovo
Sanders & Roshanai, 1992 (29), female	Vegan
Jian et al., 2015 (33)	Vegan
Harman & Parnell, 1998 (13), male	Lacto/Vegan
Liebman & Bazzarre, 1983 (21)	Lacto-ovo
Huijbregts et al., 1980 (39)	Lacto-ovo
Chen et al., 2011 (31)	Lacto-ovo
Huang et al., 2014 (32), postmenopausal	Vegan
Lee et al., 2000 (15)	Lacto-ovo
Karabudak et al., 2008 (36)	Semi/ Lacto-ovo/ Lacto
Roshanai & Sanders, 1984 (24), female	Vegan
Lin et al., 2001 (27)	Lacto-ovo
Goff et al. 2005 (35)	Vegan
Jung et al., 2013 (20)	Vegan/Lacto/Ovo/Lacto-ovo
Huang et al., 2014 (32), premenopausal	Vegan



Meta Analysis

Figure 2 **Pooled plasm** cholesterol), (**B**) LDL-C (low-density lipoprotei

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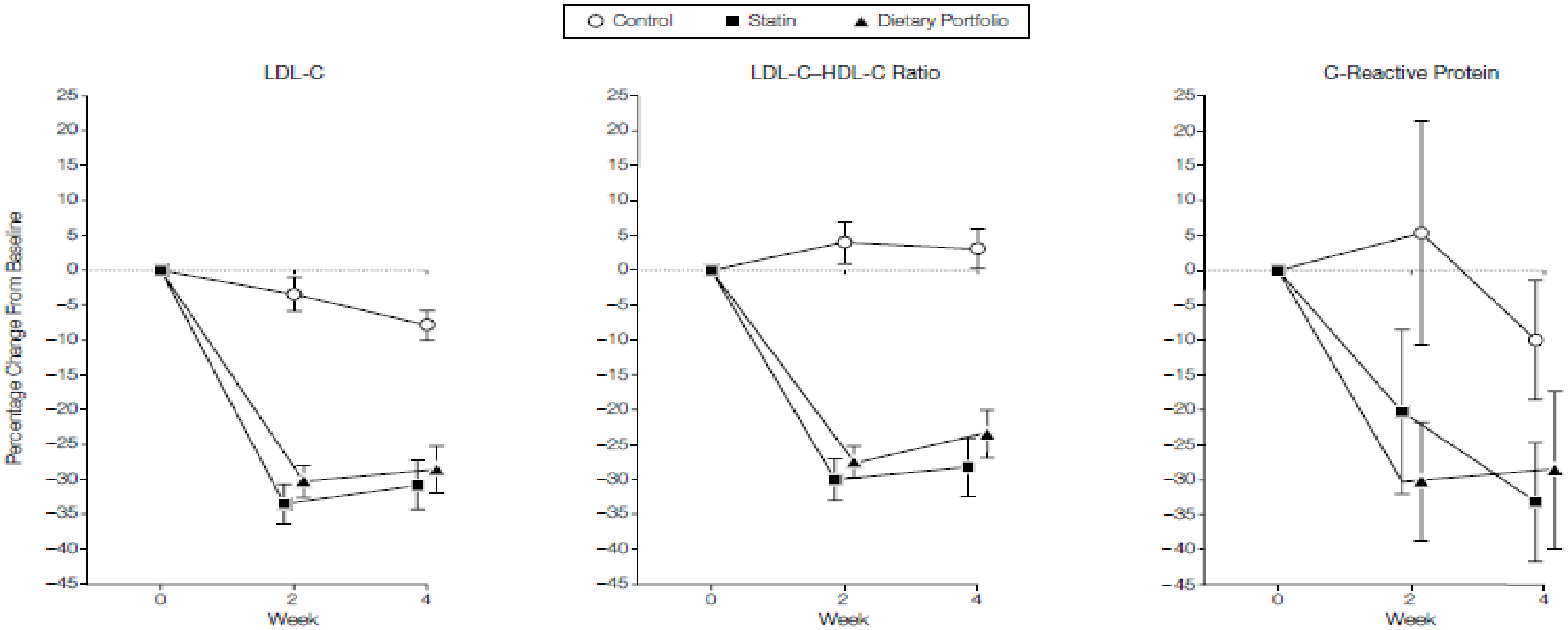
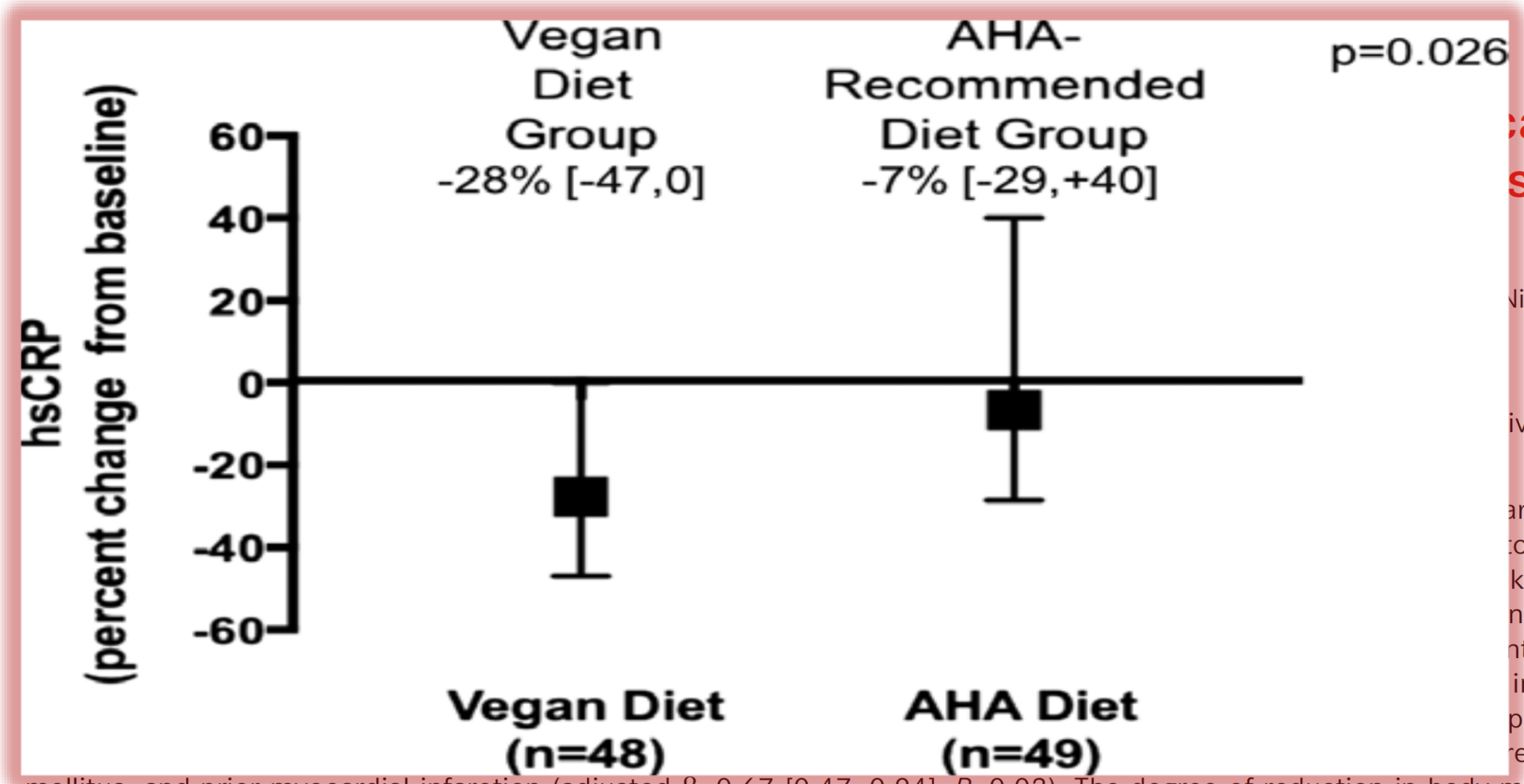
PORFOLIO DIET (*JAMA 2003*)

Figure 2. Change From Baseline in LDL-C, LDL-C–HDL-C Ratio, and C-Reactive Protein



LDL-C indicates low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol. Values are expressed as mean (SE) because, with the number of participants involved, approximately twice the SE represents a significant difference.



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Nicole Allen, BS;

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pared with the
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mellitus, and prior myocardial infarction (adjusted β, 0.67 [0.47–0.94], *P*=0.02). The degree of reduction in body mass index and waist circumference did not significantly differ between the 2 diet groups (adjusted β, 0.99 [0.97–1.00], *P*=0.10; and adjusted β, 1.00 [0.98–1.01], *P*=0.66, respectively). There were also no significant differences in markers of glycemic control between the 2

THE LANCET

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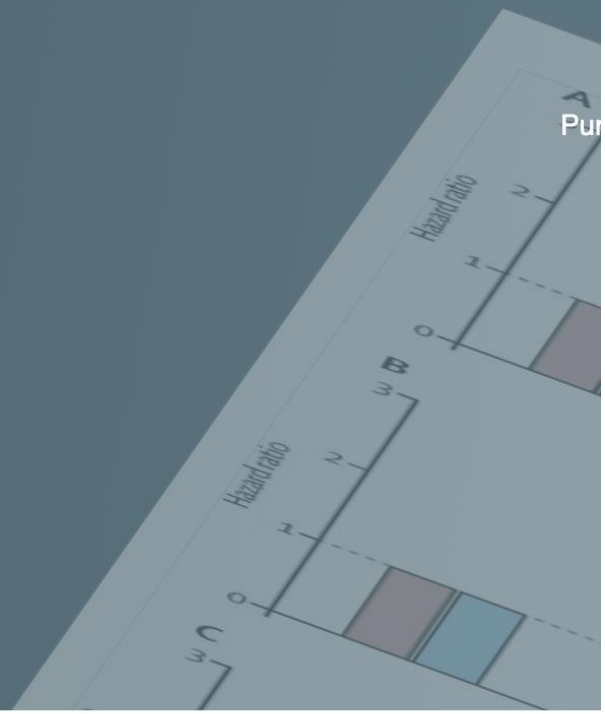
ARTICLES | VOLUME 401, ISSUE 10384, P1293-1301, APRIL 15, 2023

Inflammation and cholesterol as predictors of cardiovascular events among patients receiving statin therapy: a collaborative analysis of three randomised trials

Prof Paul M Ridker, MD • Prof Deepak L Bhatt, MD • Aruna D Pradhan, MD • Prof Robert J Glynn, ScD • Jean G MacFadyen, BA • Prof Steven E Nissen, MD • et al. Show all authors

Published: March 06, 2023 • DOI: https://doi.org/10.1016/S0140-6736(23)00215-5 • Check for updates



Summary

References

Article info

Linked Articles

Related Specialty Collections

Summary

Background

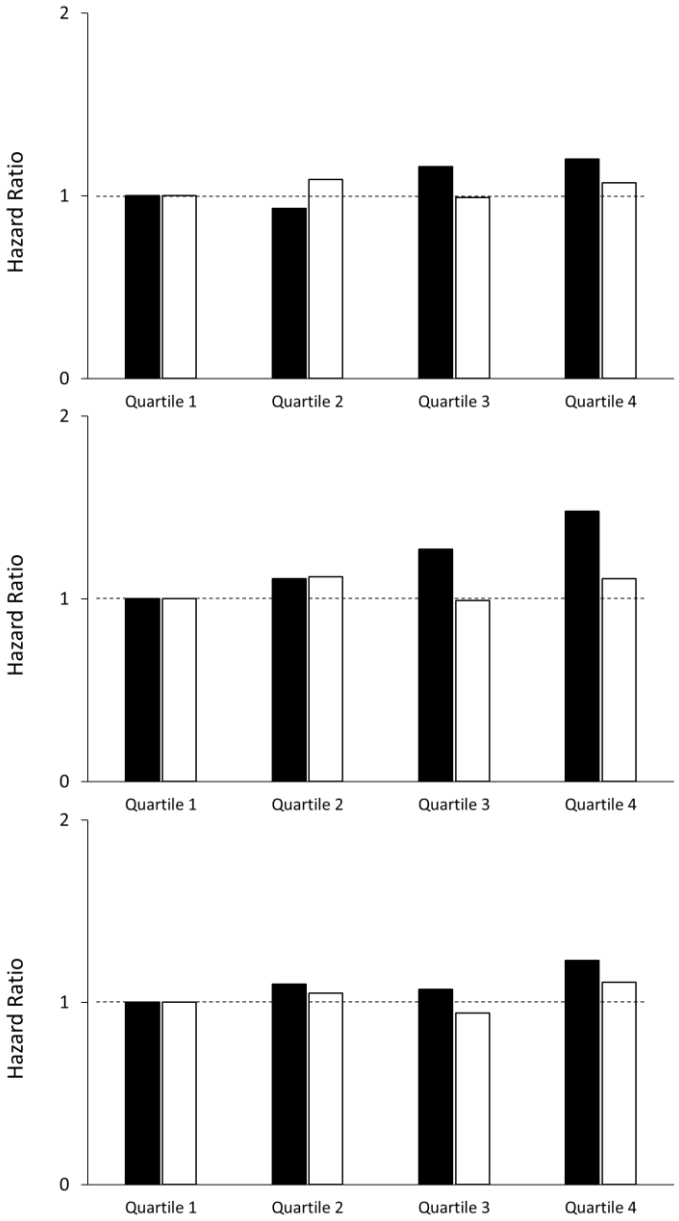
Inflammation and hyperlipidaemia jointly contribute to atherothrombotic disease. However, when people are treated with intensive statin therapy, the relative contributions of inflammation and hyperlipidaemia to the risk of future cardiovascular events might change, which has implications for the choice of adjunctive cardiovascular therapeutics. We aimed to evaluate the relative importance of high-sensitivity C-reactive protein (CRP) and low-density lipoprotein cholesterol (LDLC) as determinants of risk for major adverse cardiovascular events, cardiovascular death, and all-cause-death among patients receiving statins.

Results – III Hazard Ratios for Incident MACE Among 31,245 Statin Treated Patients

PROMINENT
(N = 9,988)

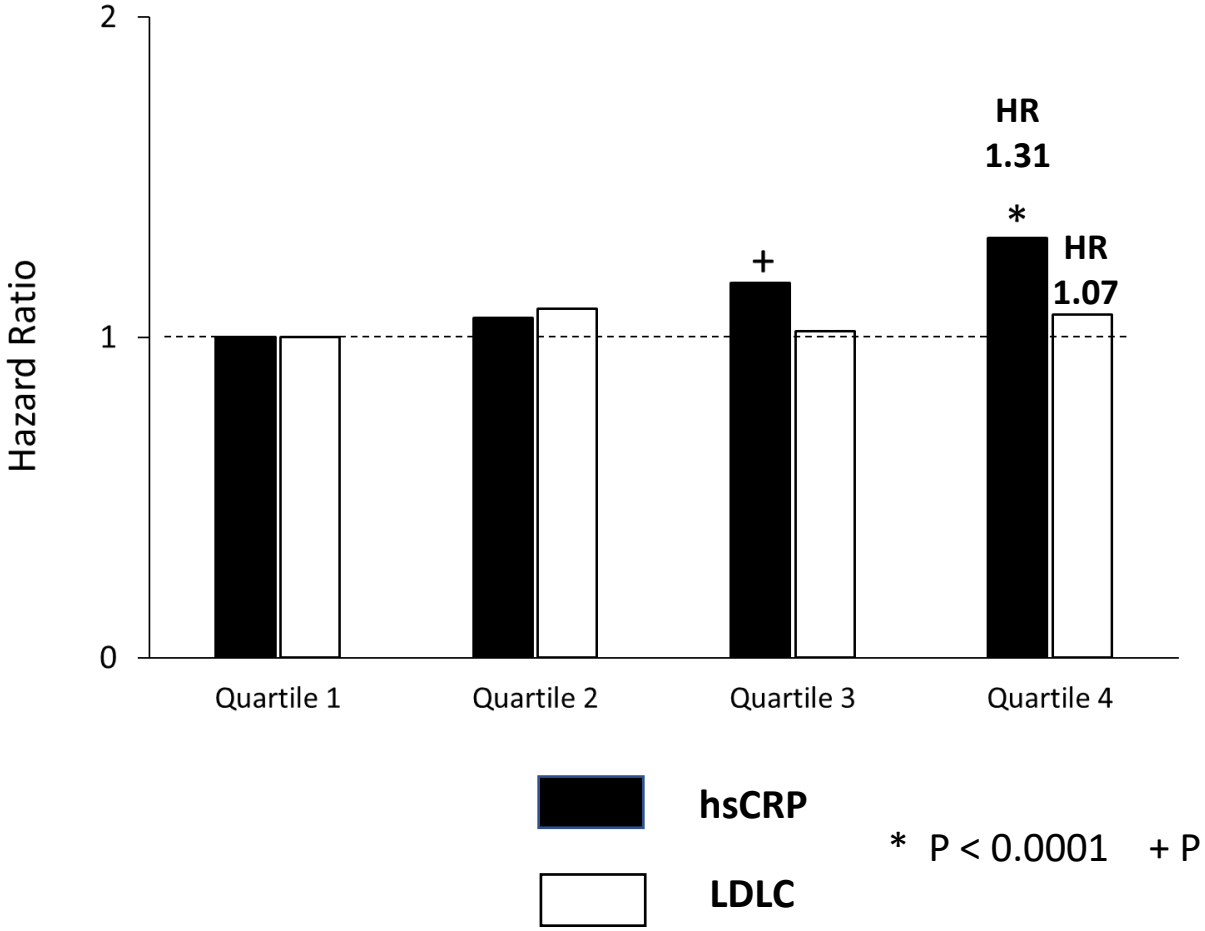
REDUCE-IT
(N = 8,179)

STRENGTH
(N = 13,078)



Pooled Data (N = 31,245)

Major Adverse Cardiovascular Events (MACE)



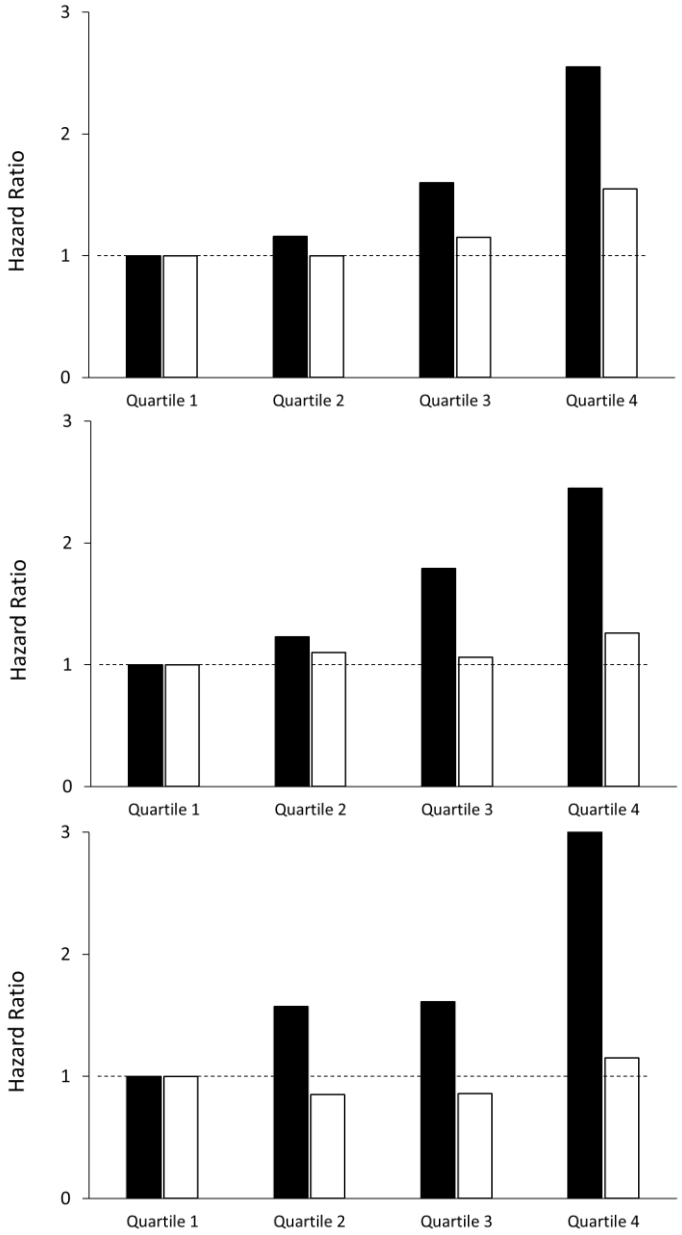
* P < 0.0001 + P < 0.05

Results – IV Hazard Ratios for Cardiovascular Death Among 31,245 Statin Treated Patients

PROMINENT
(N = 9,988)

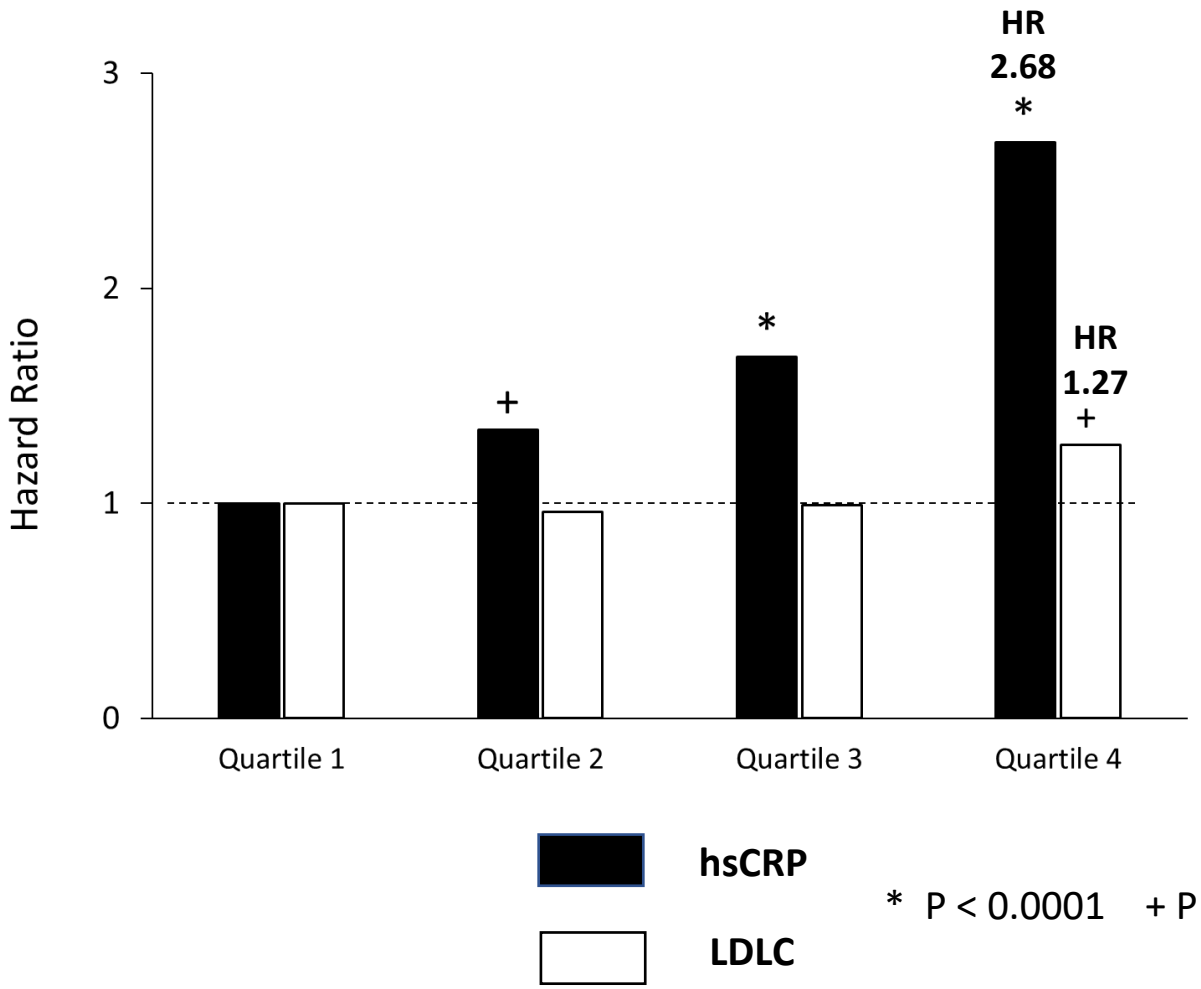
REDUCE-IT
(N = 8,179)

STRENGTH
(N = 13,078)



Pooled Data (N = 31,245)

Cardiovascular Death



* P < 0.0001 + P < 0.05

Results – VI Interaction Analyses - hsCRP < or ≥2 mg/L and/or LDLC < or ≥ 70 mg/dL

Among contemporary statin-treated patients, **residual inflammatory risk** as assessed by **hsCRP** was a stronger determinant of risk for future cardiovascular events and death than **residual cholesterol risk** as assessed by **LDLc**.

In sensitivity analysis, we found no evidence of effect modification for any endpoint in any of the three individual trials when stratified by randomized treatment assignment.

In all three trials, individuals with elevated hsCRP were at high cardiovascular risk irrespective of LDLc level.

Microbiome in Health and Disease

- Overview –what is the microbiome?
- Microbiome and classic cardiovascular risk factors
  - *Hypertension*
  - *Hyperlipidemia*
  - *Diabetes*
  - *Obesity*
  - *Inflammation*
- TMAO and nutrition
  - *Red meat*
  - *Poultry*
  - *Fish*
- TMAO and disease
  - *MI, stroke, CHF, mortality*
  - *CKD, COVID-19*

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  - *CKD, COVID-19*

We Are Not All Human!

- ***More than half of your body is not actually human.***
- Human cells make up only 43% of the body's total cell count
- The vast majority of the DNA in the body is not human – only about 20,000 genes out of about 20,000,000

We Are Not All Human!

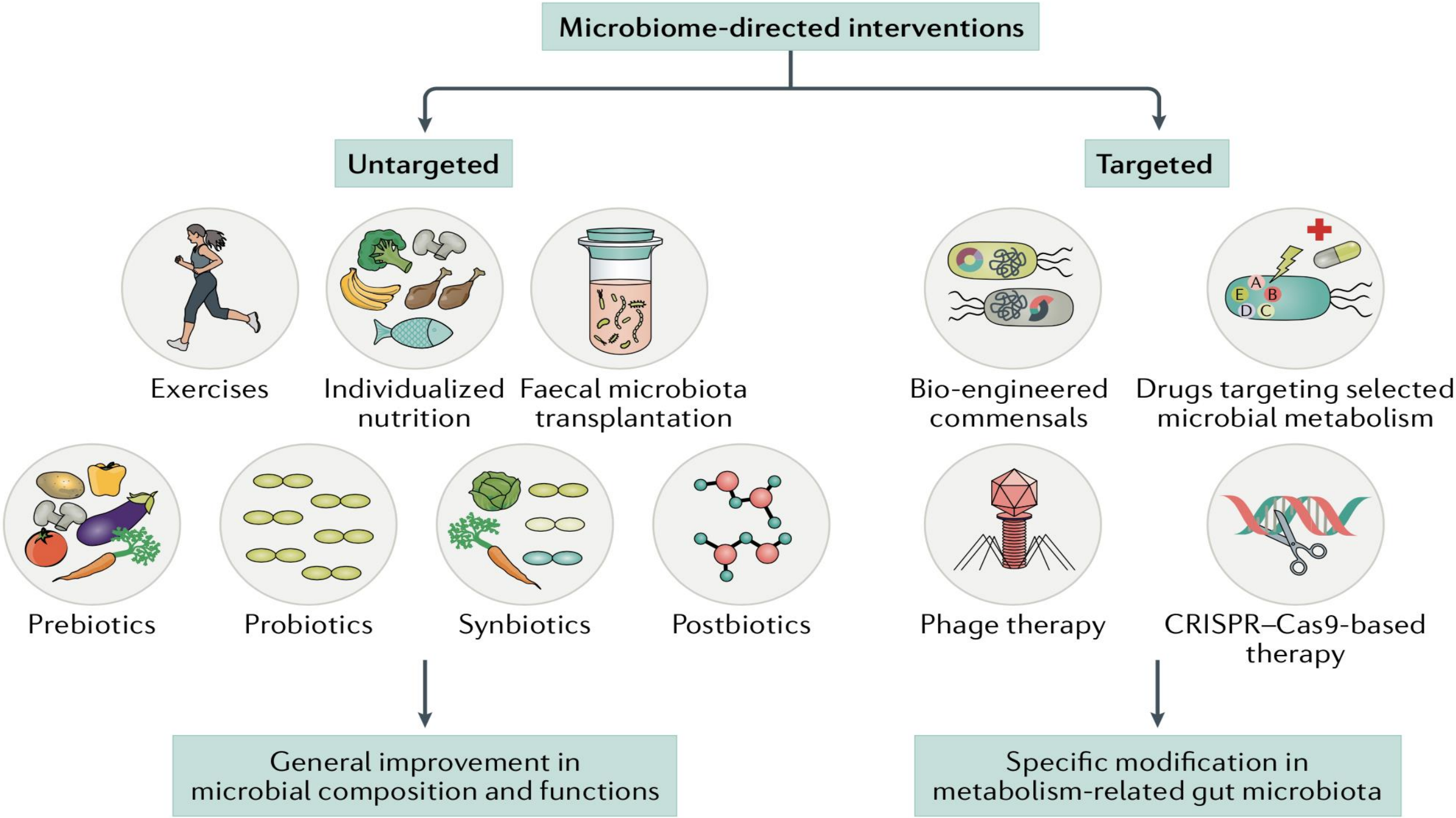
- The rest are microscopic colonists - our microbiome – comprised of bacteria, fungi, protozoa and viruses, weighing up to five pounds
- The gut's microbiome has important roles:
  - *training of host immunity*
  - *digesting food*
  - *regulating gut endocrine function and neurological signalling*
  - *modifying drug action and metabolism*
  - *eliminating toxins*
  - *producing numerous compounds that influence the host*

https://www.nature.com/articles/s41579-020-043349.pdf

We Are Not All Human!

- A harmful (“dysbiotic”) microbiome can promote diseases from allergies and autoimmune disease, to cardiac and neurological disorders
  - *Alzheimer's disease*
  - *autism spectrum disorder*
  - *multiple sclerosis*
  - *Parkinson's disease*
  - *stroke*

https://doi.org/10.1016/S1474-4422(19)30356-4


Microbiome-directed interventions
Untargeted
Targeted
Exercises
Individualized nutrition
Faecal microbiota transplantation
Bio-engineered commensals
A
B
C
D
E
Drugs targeting selected microbial metabolism
Prebiotics
Probiotics
Synbiotics
Postbiotics
Phage therapy
CRISPR–Cas9-based therapy
General improvement in microbial composition and functions
Specific modification in metabolism-related gut microbiota

Microbiome in Health and Disease

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Microbiome in Hypertension

Circulation Research

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REVIEW ARTICLE

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Abstract
Gut Microbiome-Host Immune Interaction
Gut Microbiota and Hypertension
Lifestyle Affects the Gut Microbiome
Microbiota-Derived SCFAs

The Gut Microbiome in Hyperte

Recent Advances and Future Perspec

Ellen G. Avery, Hendrik Bartolomaeus, Andras M
Dominik N. Müller

Originally published 1 Apr 2021 | https://doi.org/10.116

Abstract

The pathogenesis of hypertension is knov
environmental, hormonal, hemodynamic a
suggest that the gut microbiome plays an
gastrointestinal tract, which houses the la
the environment and the host. Accordingl
risk for hypertensive disease. One well-st
production of short-chain fatty acids and
consequently protecting against the progr
shown to impact hypertension via the mic
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research is crucial, and novel strategies t

Hypertension

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Home > Hypertension > Vol. 78, No. 3 > Essential Hypertension Is Associated With Changes in Gut Microbial Metabolic Pathways: A Multisite Analysis of Ambulatory Blood Pressure

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RESEARCH ARTICLE

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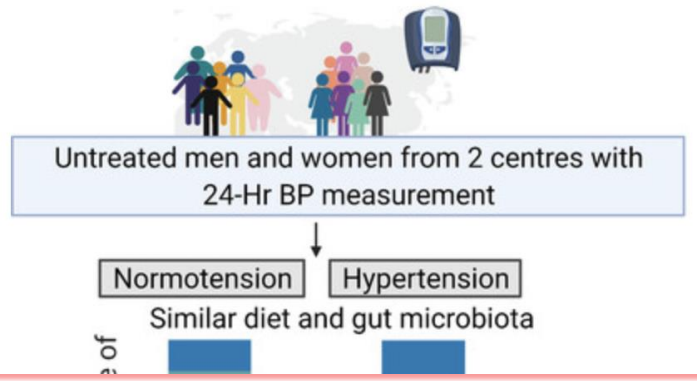
Abstract
Introduction
Methods
Results
Discussion
Perspectives
Acknowledgments

Essential Hypertension Is Associated With Changes in Gut Microbial Metabolic Pathways: A Multisite Analysis of Ambulatory Blood Pressure

Michael Nakai, Rosilene V. Ribeiro, Bruce R. Stevens, Paul Gill, Rikeish R. Muralitharan, Stephanie Yiallourou, Jane Muir, Melinda Carrington, Geoffrey A. Head, David M. Kaye, Francine Z. Marques

Originally published 2 Aug 2021 | https://doi.org/10.1161/HYPERTENSIONAHA.121.17288 | Hypertension. 2021;78:804–815

Abstract



Microbiome in Hypertension

- Contributing factors:
  - *genetic*
  - *environmental*
  - *hormonal*
  - *hemodynamic*
  - *inflammatory forces*
- Dietary fiber leads to the production of short-chain fatty acids and anti-inflammatory immune cells, reducing hypertension.
- Dietary interventions such as fasting reduce hypertension
- Reduced "alpha diversity" present in hypertensive patients
- Gram-negative microbiota: *Klebsiella, Parabacteroides, Desulfovibrio, and Prevotella* associated with higher BP

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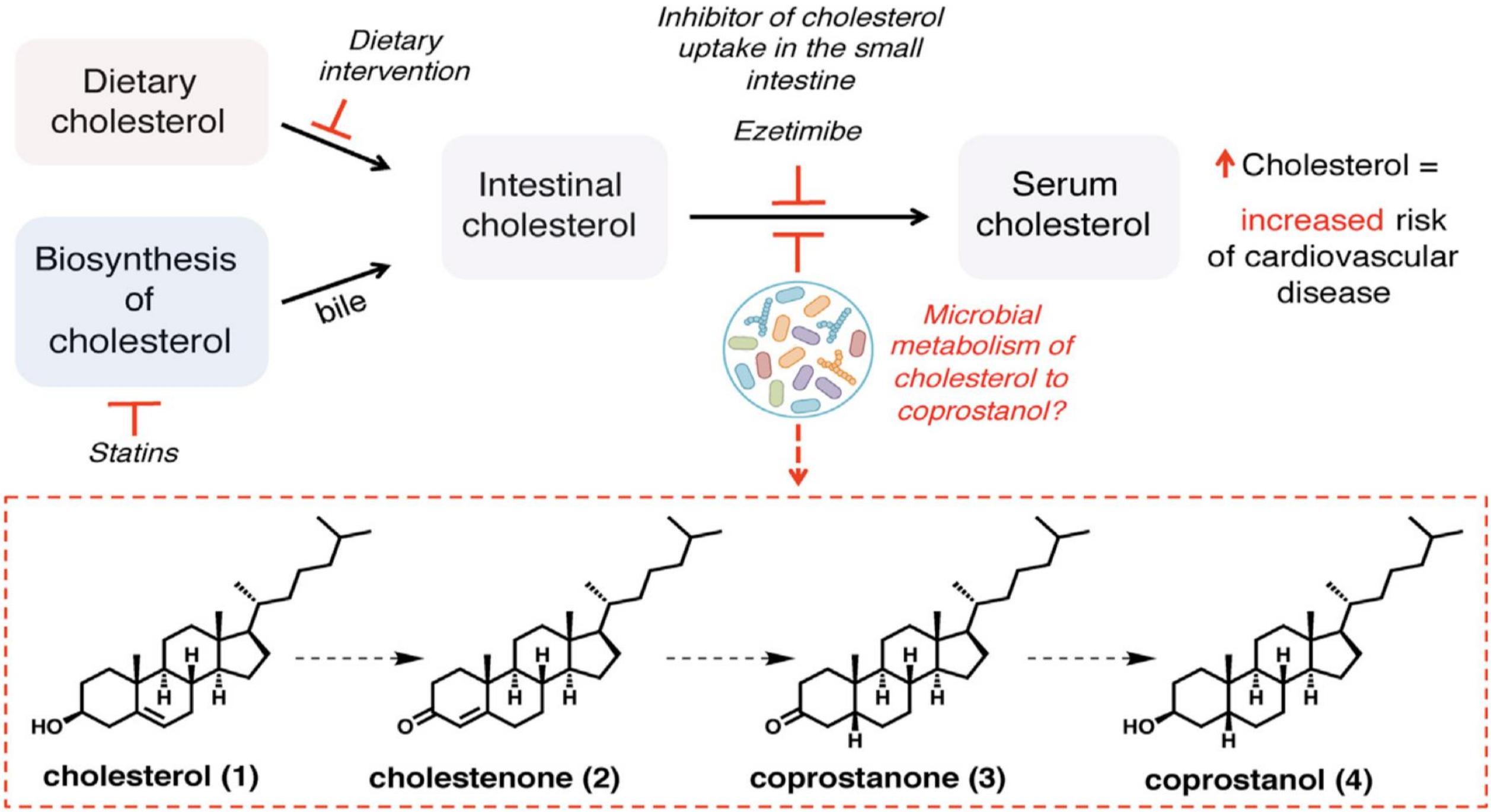
Microbiome in Hyperlipidemia

- Bioinformatics enabled discovery of ismA, a microbial cholesterol dehydrogenase
- Metagenomic species with ismA genes form coprostanol in microbial communities
- ismA+ species are associated with decreased fecal and serum cholesterol in humans
- Effect sizes of ismA+ species on serum cholesterol are on par with human genetics

Kenny et al., 2020, Cell Host & Microbe 28, 245–257
August 12, 2020 a 2020 The Authors. Published by Elsevier Inc https://doi.org/10.1016/j.chom.2020.05.013


Dietary cholesterol
Biosynthesis of cholesterol
Dietary intervention
bile
Statins
Intestinal cholesterol
Inhibitor of cholesterol uptake in the small intestine
Ezetimibe
Serum cholesterol
Cholesterol = increased risk of cardiovascular disease
Microbial metabolism of cholesterol to coprostanol?
HO
O
cholesterol (1)
cholestenone (2)
coprostanone (3)
coprostanol (4)

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Microbiome in Type II Diabetes

- A substantial body of literature has provided evidence for the role of gut microbiota in metabolic diseases including type 2 diabetes.
- Data from 42 human studies reporting microbial associations with disease
- Preclinical studies or clinical trials using treatments with probiotics
- *Bifidobacterium*, *Bacteroides*, *Faecalibacterium*, *Akkermansia and Roseburia* were negatively associated with T2D
- *Ruminococcus*, *Fusobacterium*, and *Blautia* were positively associated
- Molecular mechanisms of microbiota in the onset and progression

Contents lists available at ScienceDirect

EBioMedicine

journal homepage: www.elsevier.com/locate/ebiom

Review

Role of gut microbiota in type 2 diabetes pathophysiology

Manoj Gurung[a,1], Zhipeng Li[a,1], Hannah You[a,1], Richard Rodrigues[b], Donald B Jump[c], Andrey Morgun[b,*], Natalia Shulzhenko[a,*]

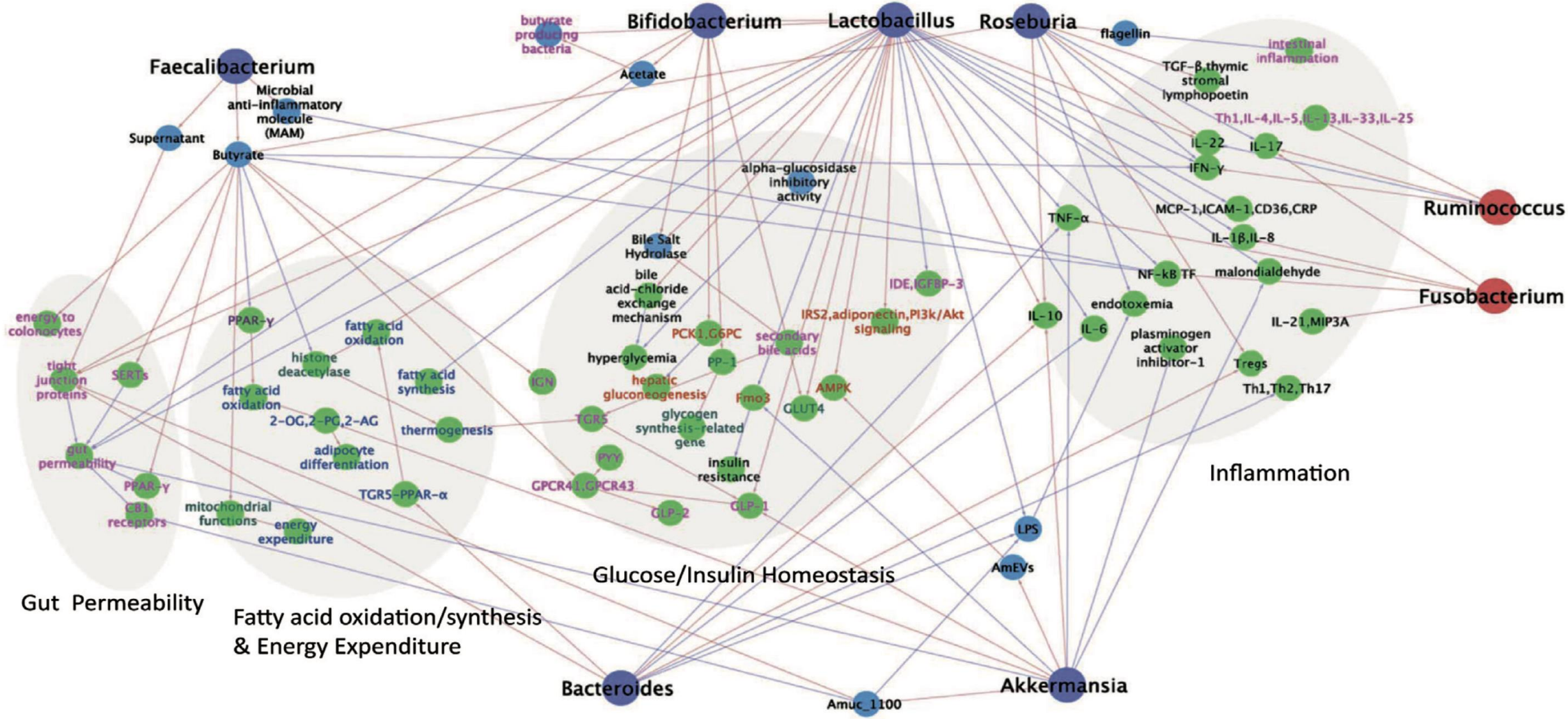
[a] *Colleges of Veterinary Medicine, Oregon State University, 700 SW 30th street, Corvallis, OR, 97331, USA*
[b] *Colleges of Pharmacy, Oregon State University, 160 SW 26th street, Corvallis, OR 97331, USA*
[c] *Colleges of Public Health, Oregon State University, 160 SW 26th street, Corvallis, OR 97331, USA*

ARTICLE INFO

Article History:
Received 17 May 2019

ABSTRACT

A substantial body of literature has provided evidence for the role of gut mic
including type 2 diabetes. However, reports vary regarding the association of



Color of labels in the node represents different organs where microbiota potentially elicit its effect: adipose tissue, gut, liver, liver&adipose tissue, muscle, systemic
Color of nodes: host features/products; microbial products; microbe positively associated with disease, microbe negatively associated with disease
Color of edge: blue, negative association between nodes, red, positive association between nodes

Fig. 2. Literature-based network analysis of potential effects on metabolism of bacterial taxa consistently found in association with human T2D (shown in Fig. 1). References corresponding to each edge can be found in the text.

Microbiome in Obesity

- The gut microbiota:
  - *protect gastrointestinal mucosa permeability*
  - *regulate the fermentation and absorption of dietary polysaccharides*
  - *regulate fat accumulation and the resultant obesity*
- The microbiota could contribute to obesity and the related metabolic diseases:
  - *abundance of bacteria that ferment carbohydrates, leading to increased rates of short-chain fatty acid (SCFA) biosynthesis*
  - *extra source of energy for the host, that is eventually stored as lipids or glucose*
  - *increased intestinal permeability to bacterial lipopolysaccharides (LPS)*
  - *elevated systemic LPS levels increase low-grade inflammation and insulin resistance*
  - *increased activity of the gut endocannabinoid system.*

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Microbiome in Obesity

- Fecal transplantation studies show causative role of the gut microbiota in the development of obesity and obesity-related disorders.

- Diet +/− bariatric surgery have been reported to modulate the gut microbiota, leading to lean host phenotype body composition

Microbiome in Health and Disease

- Overview –what is the microbiome?
- Microbiome and classic cardiovascular risk factors
  - *Hypertension*
  - *Hyperlipidemia*
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  - *Inflammation*
- TMAO and nutrition
  - *Red meat*
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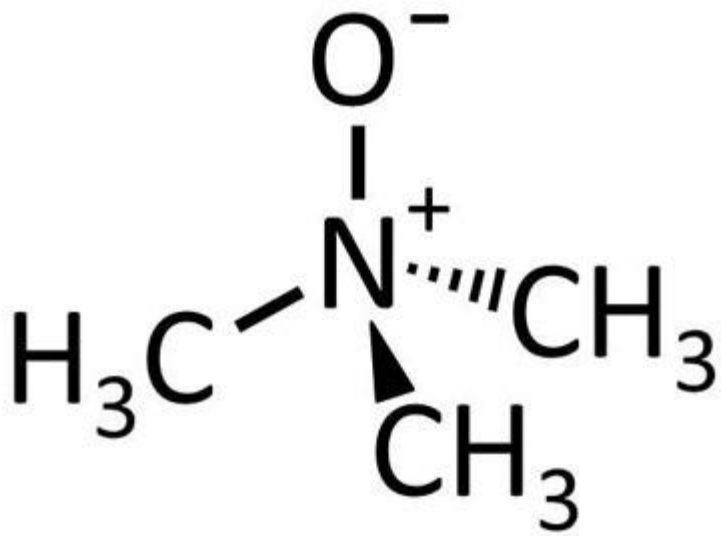
  - *MI, stroke, CHF, mortality*
  - *CKD, COVID-19*

TMAO

Trimethylamine Oxide



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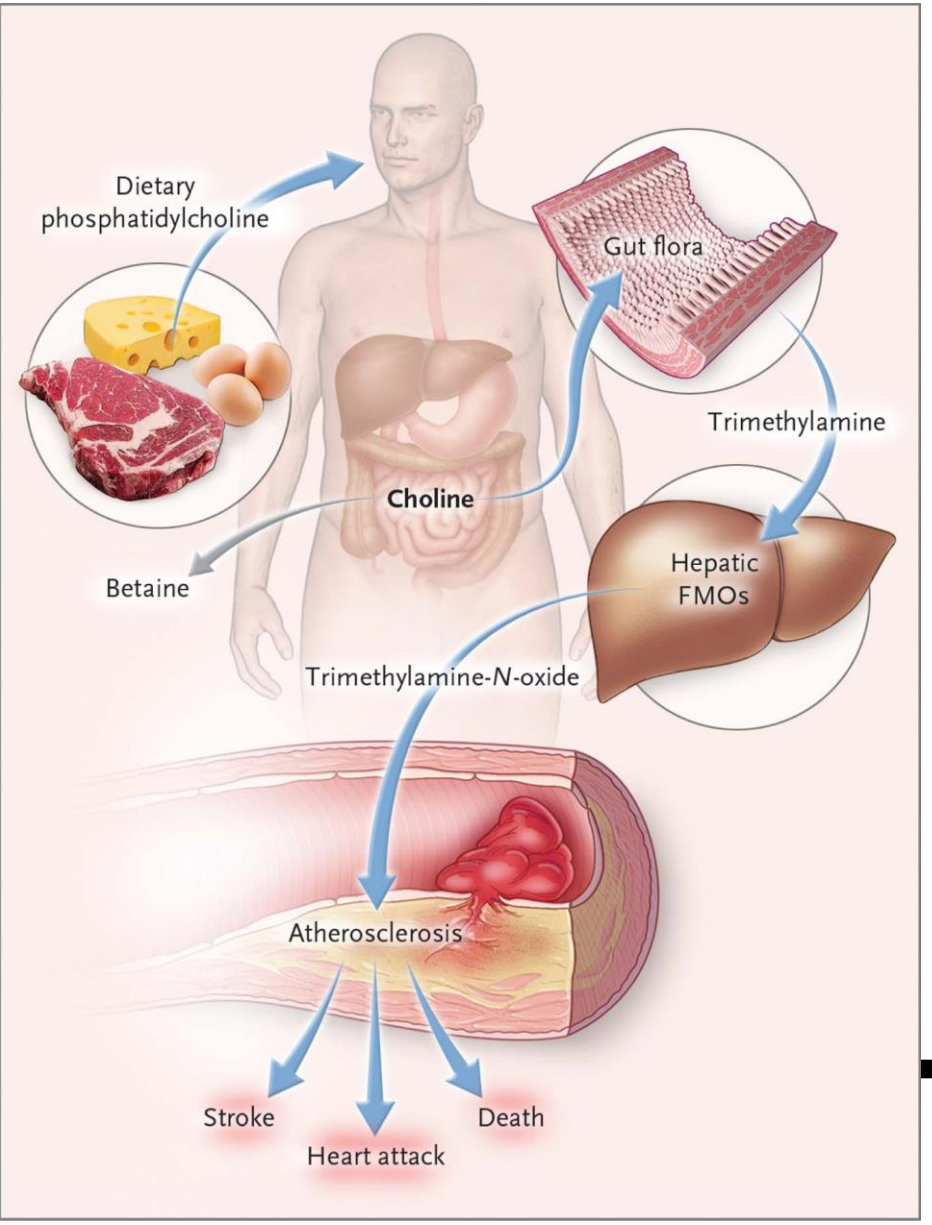
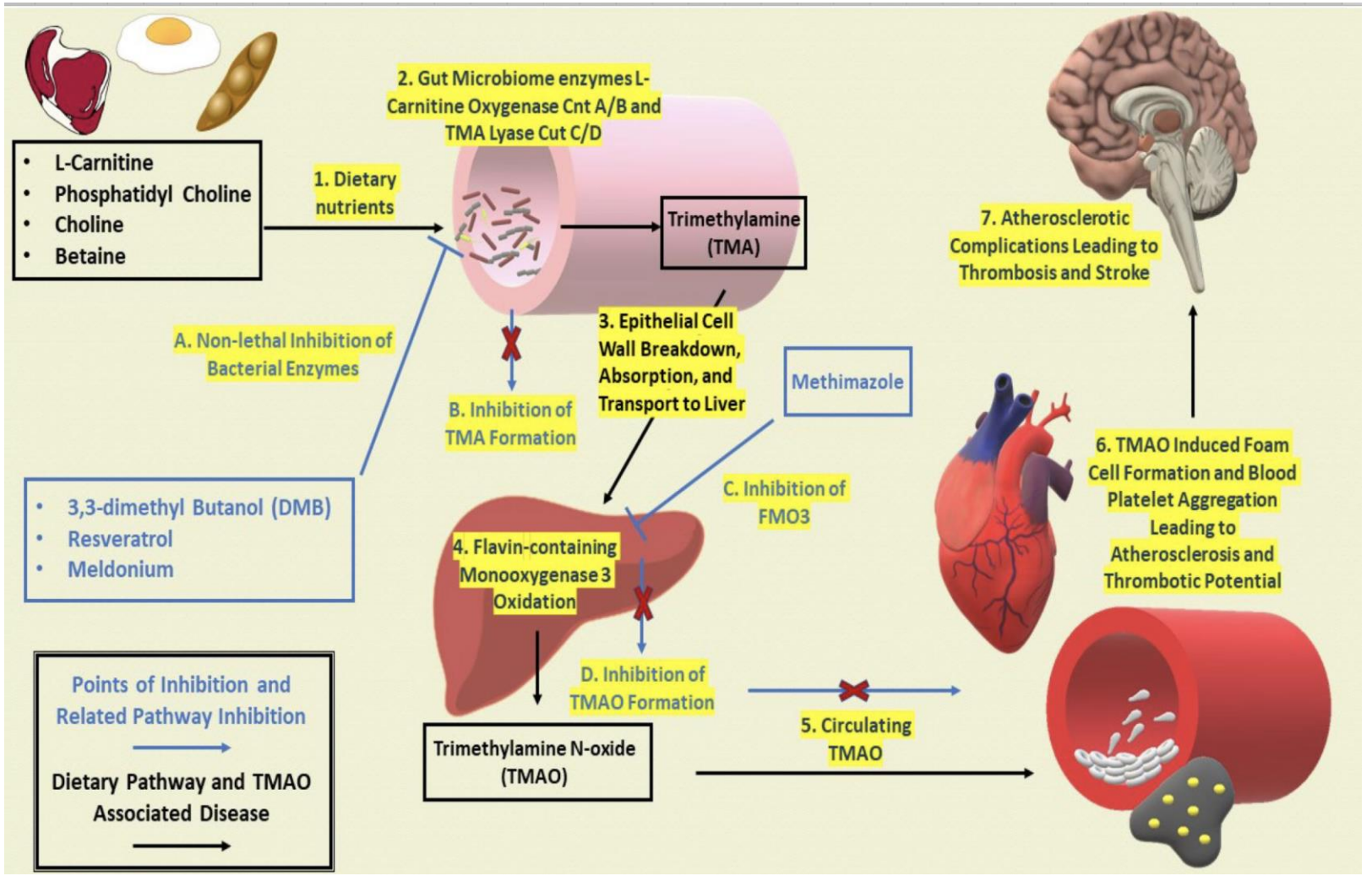
Pathways Linking Dietary Phosphatidylcholine, Intestinal Microbiota, and Incident Adverse Cardiovascular Events.





Tang WHW et al. N Engl J Med 2013 (3):`1575-1584

The NEW ENGLAND JOURNAL of MEDICINE

ESC European Society of Cardiology

European Heart Journal (2019) **40**, 583–594
doi:10.1093/eurheartj/ehy799

CLINICAL RESEARCH
Prevention and epidemiology

Impact of chronic dietary red meat, white me… …e N-… in h…

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W.H. …

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Children's H… … of
Pharmacy, T… … eland Clinic,
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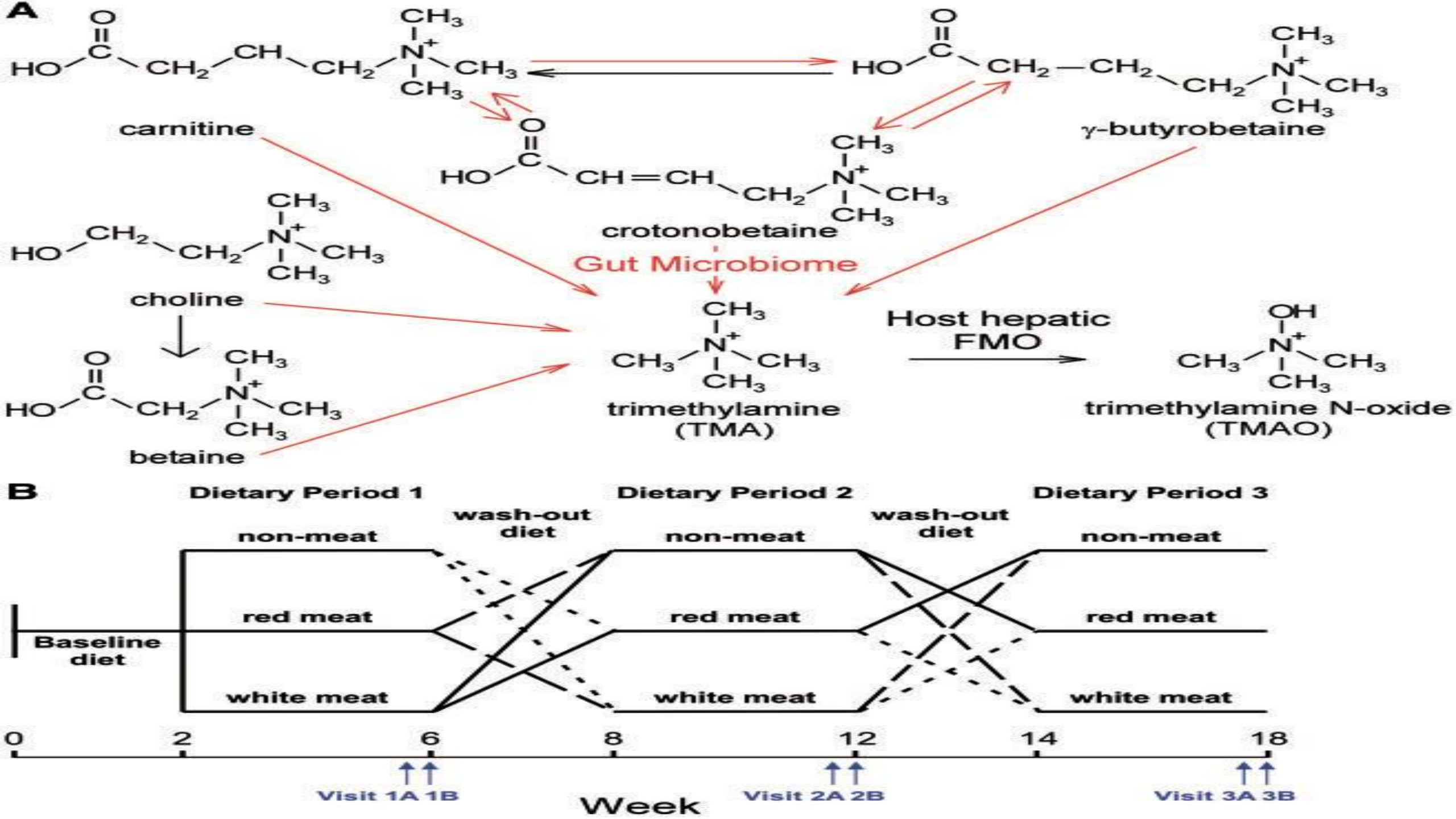
Received 23…

See page…

Conclusion: Chronic dietary red meat increases systemic TMAO levels through: (i) enhanced dietary precursors; (ii) increased microbial TMA/TMAO production from carnitine, but not choline; and (iii) reduced renal TMAO excretion. Discontinuation of dietary red meat reduces plasma TMAO within 4 weeks.

Aims Carnitine and choline are major nutrient precursors for gut microbiota-dependent generation of the atherogenic metabolite, trimethylamine N-oxide (TMAO). We performed randomized-controlled dietary intervention studies to explore the impact of chronic dietary patterns on TMAO levels, metabolism and renal excretion.


A
carnitine
γ-butyrobetaine
crotonobetaine
Gut Microbiome
choline
betaine
trimethylamine
(TMA)
Host hepatic
FMO
trimethylamine N-oxide
(TMAO)
B
Dietary Period 1
Dietary Period 2
Dietary Period 3
wash-out
diet
wash-out
diet
non-meat
red meat
white meat
Baseline
diet
0
2
6
8
12
14
18
Visit 1A 1B
Visit 2A 2B
Visit 3A 3B
Week

Microbiome in Health and Disease

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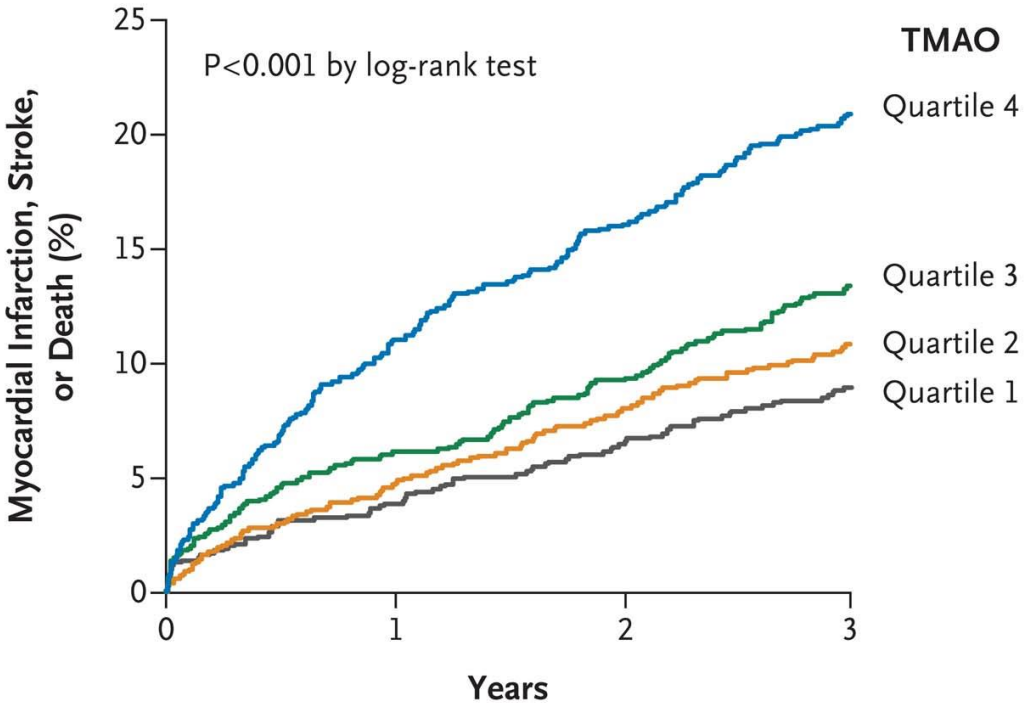
  - *MI, stroke, CHF, mortality*
  - *CKD, COVID-19*

Kaplan–Meier Estimates of Major Adverse Cardiovascular Events, According to the Quartile of TMAO Level.



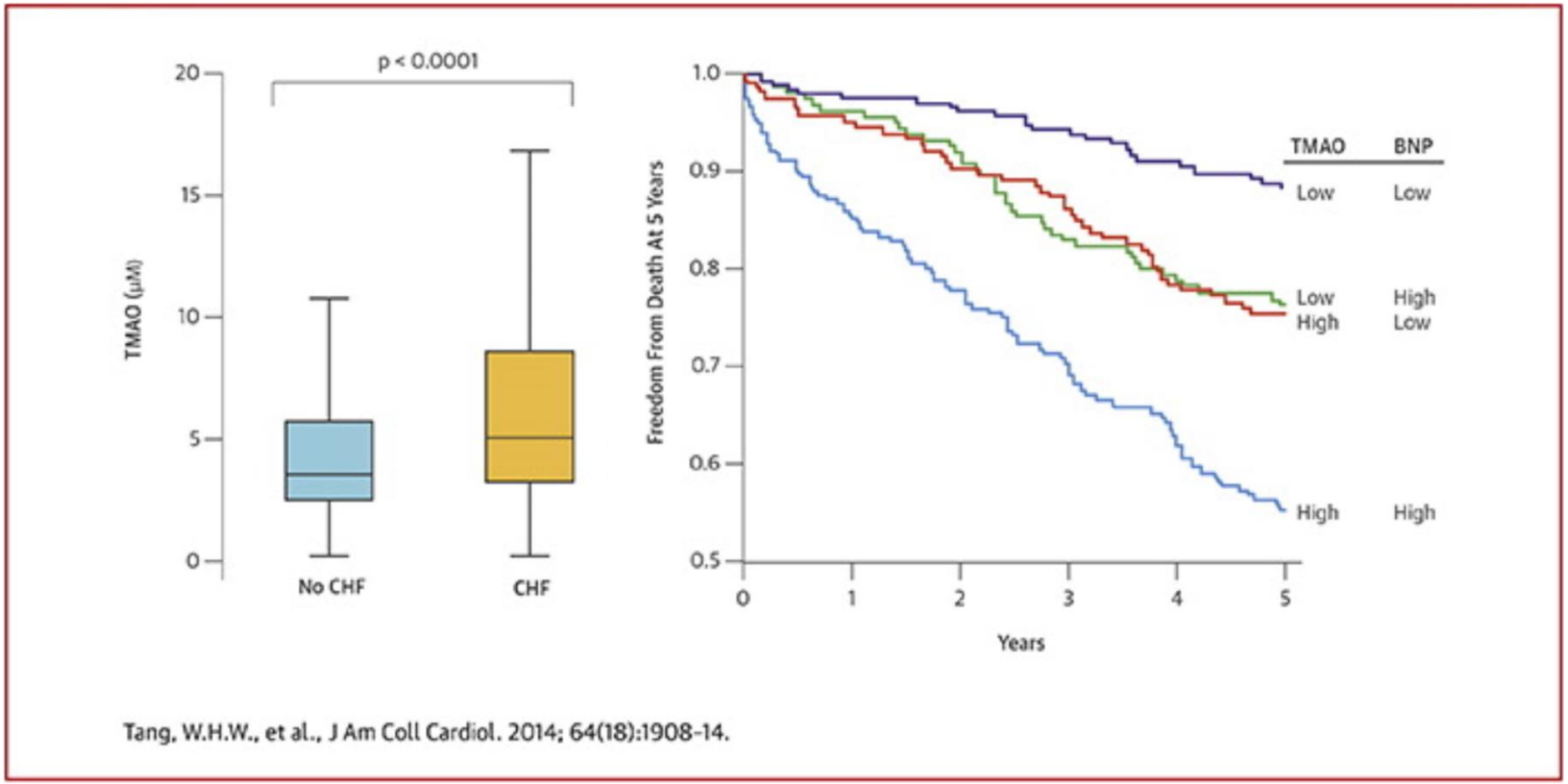
No. at Risk

Quartile 1	1001	933	869	827
Quartile 2	998	940	884	843
Quartile 3	1003	938	888	835
Quartile 4	1005	913	849	791

Tang WHW et al. N Engl J Med 2013;368:1575-1584

Prognostic Value of Elevated Levels of Intestinal Microbe-Generated Metabolite Trimethylamine-N-Oxide in Patients With Heart Failure: Refining the Gut Hypothesis

J Am Coll Cardiol. 2014;64(18):1908-1914. doi:10.1016/j.jacc.2014.02.617



Comparison of Fasting TMAO Levels Between Patients With Stable Heart Failure and Apparently Healthy Controls

(Left) Trimethylamine-N-oxide (TMAO) concentration was higher in patients with stable heart failure than healthy controls and (Right) portended poorer survival at higher levels regardless of B-type natriuretic peptide levels. Kaplan-Meier curves for 5-year all-cause mortality with TMAO with TMAO/B-type natriuretic peptide (BNP) stratified at median levels.

ONLINE FIRST

Red Meat Consumption and Mortality

Results From 2 Prospective Cohort Studies

An Pan, PhD; Qi Sun, MD, ScD; Adam M. Bernstein, MD, ScD; Matthias B. Schulze, DrPH; JoAnn E. Manson, MD, DrPH; Meir J. Stampfer, MD, DrPH; Walter C. Willett, MD, DrPH; Frank B. Hu, MD, PhD

Background: F…tality and 1.10 …ated with an in… …r mortality. We ever, its relation… …er day of other …s, low-fat dairy, **Methods:** We p… …red meat were the Health Profe… …y risk. We also and 83 644 wom… …7.6% in women 2008) who were … …the end of fol- cancer at baseli… …r than 0.5 serv- frequency quest… …ed meat.

Conclusions: Red meat consumption is associated with an increased risk of total, CVD, and cancer mortality. Substitution of other healthy protein sources for red meat is associated with a lower mortality risk.

Results: We documented 23 926 deaths (including 5910 CVD and 9464 cancer deaths) during 2.96 million person-years of follow-up. After multivariate adjustment for major lifestyle and dietary risk factors, the pooled hazard ratio (HR) (95% CI) of total mortality for a 1-serving-per-day increase was 1.13 (1.07-1.20) for unprocessed red meat and 1.20 (1.15-1.24) for processed red meat. The corresponding HRs (95% CIs) were 1.18 (1.13-

Conclusions: Red meat consumption is associated with an increased risk of total, CVD, and cancer mortality. Substitution of other healthy protein sources for red meat is associated with a lower mortality risk.

Arch Intern Med.
Published online March 12, 2012.
doi:10.1001/archinternmed.2011.2287

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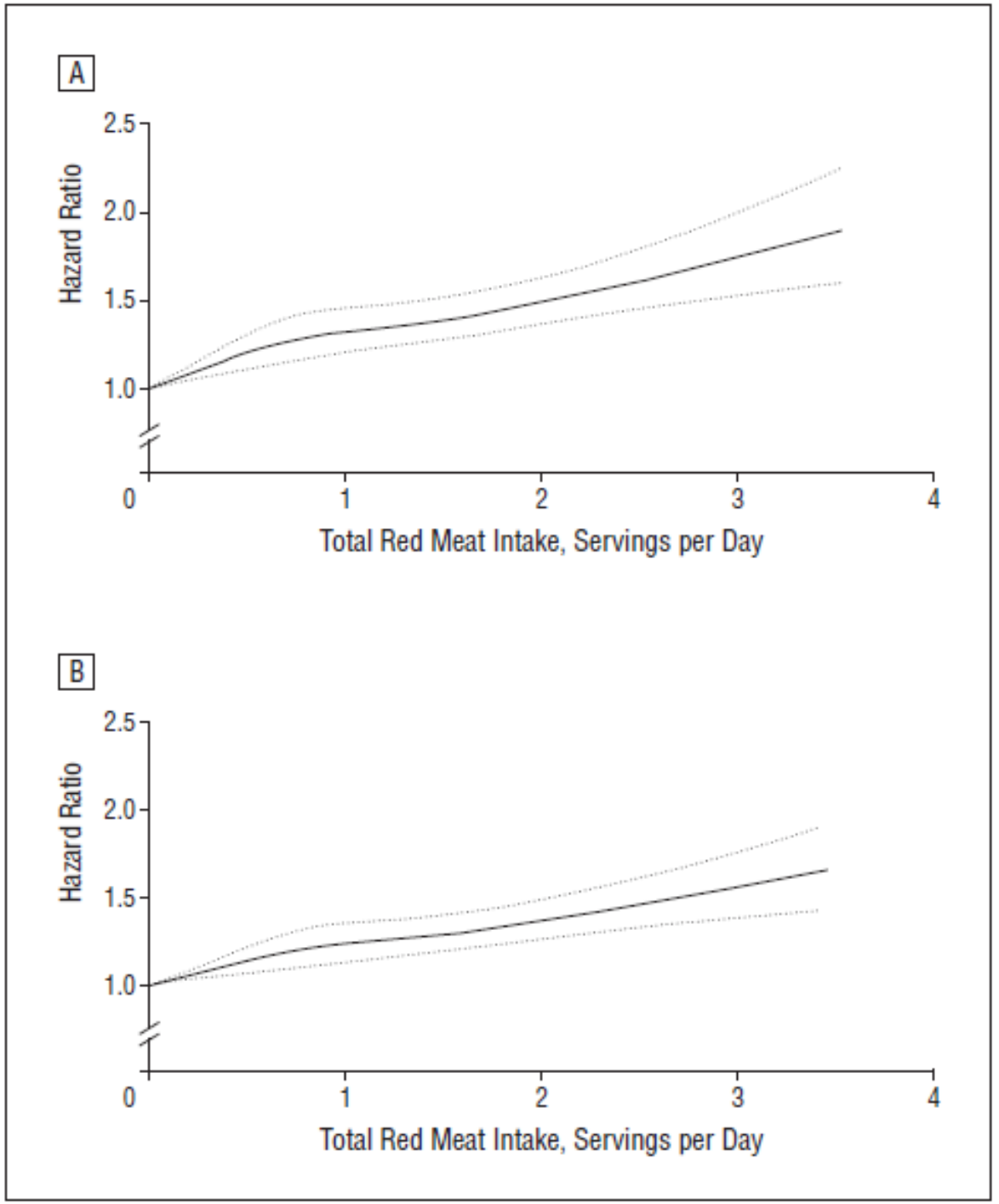
Figure 1. Dose-response relationship between red meat intake and risk of all-cause mortality in the Health Professionals Follow-up Study (A) and the Nurses' Health Study (B). The results were adjusted for age (continuous); body mass index (calculated as weight in kilograms divided by height in meters squared) category (23.0, 23.0-24.9, 25.0-29.9, 30.0-34.9, or 35); alcohol consumption (0, 0.1-4.9, 5.0-29.9, 30.0 g/d in men; 0, 0.1-4.9, 5.0-14.9, or 15.0 g/d in women); physical activity level (3.0, 3.0-8.9, 9.0-17.9, 18.0-26.9, or 27.0 hours of metabolic equivalent tasks per week); smoking status (never, past, or current [1-14, 15-24, or 25 cigarettes per day]); race (white or nonwhite); menopausal status and hormone use in women (premenopausal, postmenopausal never users, postmenopausal past users, or postmenopausal current users); family history of diabetes mellitus, myocardial infarction, or cancer; history of diabetes mellitus, hypertension, or hypercholesterolemia; and intakes of total energy, whole grains, fruits, and vegetables, all in quintiles. Broken lines represent 95% CI.



CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION
2021, AHEAD-OF-PRINT, 1-12
https://doi.org/10.1080/10408398.2021.1949575

Taylor & Francis
Taylor & Francis Group

Higher consumption of ***unprocessed red meat was associated with a 9%*** (relative risk (RR) per 50 g/day higher intake, 1.09; 95% confidence intervals (CI), 1.07 to 1.16; $n_{studies}$ = 12) and ***processed meat intake with an 18%*** higher risk of IHD (1.18; 95% CI, 1.12 to 1.25; $n_{studies}$ = 10

Meat
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Key[a]

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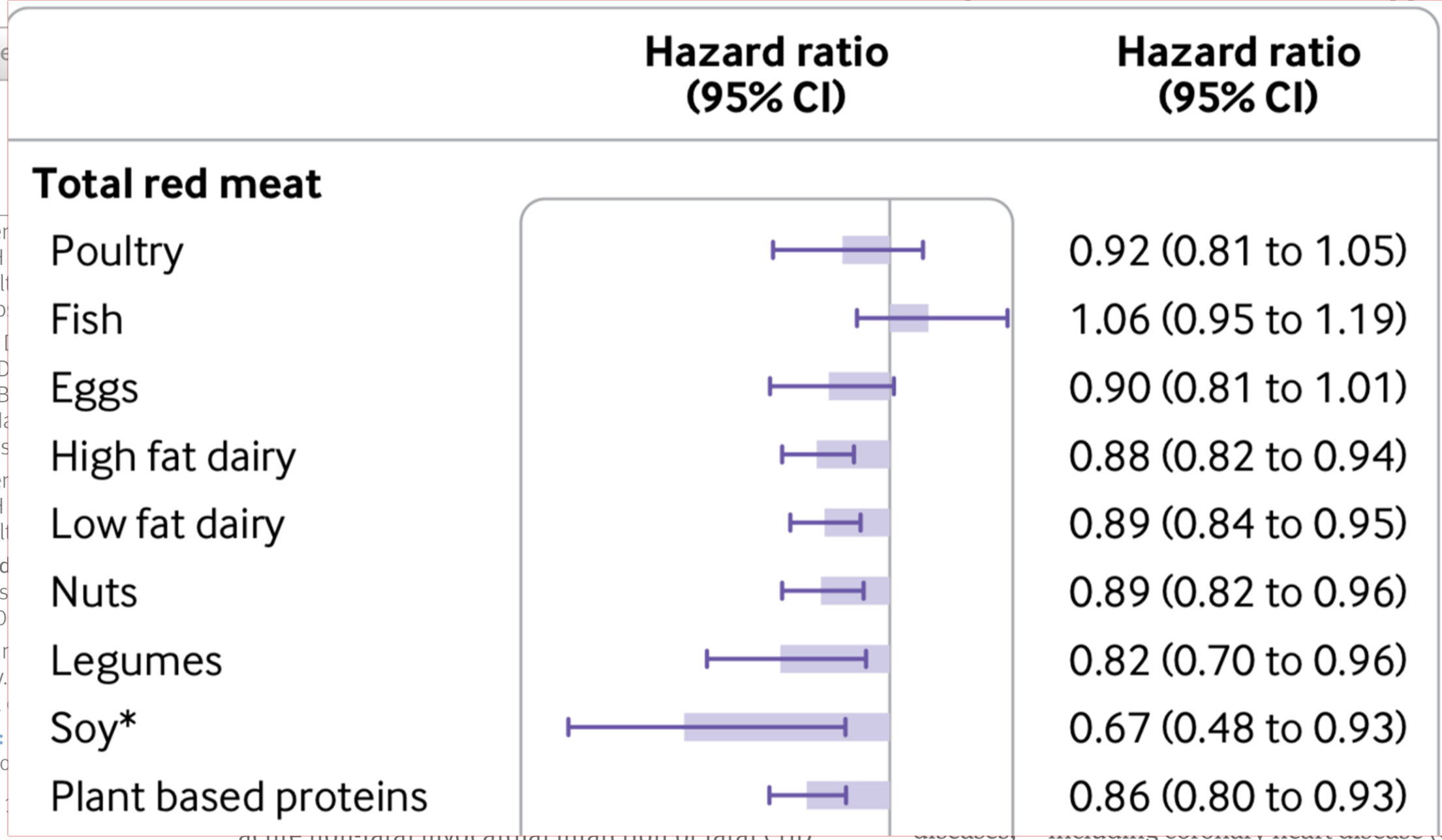
ABSTRACT

There is uncertainty regarding the association between unprocessed red and processed meat consumption and the risk of ischemic heart disease (IHD), and little is known regarding the association with poultry intake. The aim

Red meat intake and risk of coronary heart disease among US



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acute non-fatal myocardial infarction or fatal CHD. Cox models were used to estimate hazard ratios

diseases, including coronary heart disease (CHD). Consequently, the 2015-20 US Dietary Guidelines for

Processed and Unprocessed Red Meat Consumption and Risk of Heart Failure

Prospective Study of Men

"Men who consumed ≥75 g/d processed meat compared with those who consumed <25 g/d had a ***1.28*** (95% confidence interval, 1.10–1.48, *P* trend=0.01) higher risk of ***HF incidence*** and ***2.43*** (95% confidence interval, 1.52–3.88, *P* trend<0.001) higher risk of ***HF mortality***."

Background—F) are scarce. We examined the mortality in men.

Methods and Rn, aged 45 to 79 years, with n essed with a self-administered 6 deaths from HF were ascertai ith risk of HF in both age- an d with those who consumed <2 ncidence and 2.43 (95% confid unprocessed meat was not associated with increased risk of incidence of HF or mortality from HF.

Conclusions—Findings from this prospective study of men with low to moderate red meat consumption indicate that processed red meat consumption, but not unprocessed red meat, is associated with an increased risk of HF. (***Circ Heart Fail.* 2014;7:552-557.**)

Key Words: heart failure ■ processed meat ■ prospective cohort study ■ red meat

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY
VOL. 73, NO. 16, 2019

PUBLISHED BY ELSEVIER

SPECIAL FO

Dietary
Incider
Withou

Kyla M. Lara, MI
Monika M. Saffo
DrPH, PA-C,[d]

"... After a median of 8.7 years of follow-up, 363 participants had incident HF hospitalizations.

Compared with the lowest quartile, the highest quartile of adherence to the ***plant-based dietary pattern*** was associated with a ***41% lower risk of HF*** in multivariable-adjusted models (hazard ratio: 0.59; 95% confidence interval: 0.41 to 0.86; p = 0.004) ..."

ABSTRACT

BACKGROUN
n the United States.

OBJECTIVES The purpose of this study was to determine associations of 5 dietary patterns with incident HF hospitalizations among U.S. adults.

frontiers in Nutrition

REVIEW
published: 17 April 2019
doi: 10.3389/fnut.2019.00047

Check for updates

"A plant-based diet appears to be beneficial for human health by promoting the development of more diverse and stable microbial systems. Additionally, vegans and vegetarians have significantly higher counts of certain Bacteroidetes-related operational taxonomic units compared to omnivores . . . In conclusion, the available literature suggests that a ***vegetarian/vegan diet is effective in promoting a diverse ecosystem of beneficial bacteria to support both human gut microbiome*** and overall health."

compared to omnivores. Fibers (that is, non-digestible carbohydrates, found exclusively in plants) most consistently increase lactic acid bacteria, such as *Ruminococcus*, *E. rectale*, and *Roseburia*, and reduce *Clostridium* and *Enterococcus* species. Polyphenols, also abundant in plant foods, increase *Bifidobacterium* and *Lactobacillus*, which provide

JAMA | Original Investigation

Associations of Dietary Cholesterol or Egg Consumption With Incident Cardiovascular Disease and Mortality

Victor W. Zhong, PhD; Linda Van Horn, PhD; Marilyn C. Cornelis, PhD; John T. Wilkins, MD, MS; Hongyan Ning, MD, MS; Mercedes R. Carnethon, PhD; Philip Greenland, MD; Robert J. Mentz, MD; Katherine L. Tucker, PhD; Lihui Zhao, PhD; Arnita F. Norwood, PhD; Donald M. Lloyd-Jones, MD, ScM; Norrina B. Allen, PhD

IMPORTANCE Cholesterol is a common nutrient in the human diet and eggs are a major source of dietary cholesterol. Whether dietary cholesterol or egg consumption is associated with cardiovascular disease (CVD) and mortality remains controversial.

OBJECTIVE To determine the associations of dietary cholesterol or egg consumption with incident CVD and all-cause mortality.

DESIGN, SETTING, AND PARTICIPANTS Individual participant data were pooled from 6 prospective US cohorts using data collected between March 25, 1985, and August 31, 2016. Self-reported diet data were harmonized using a standardized protocol.

EXPOSURES Dietary cholesterol (mg/day) or egg consumption (number/day).

MAIN OUTCOMES AND MEASURES Hazard ratio (HR) and absolute risk difference (ARD) over the entire follow-up for incident CVD (composite of fatal and nonfatal coronary heart disease, stroke, heart failure, and other CVD deaths) and all-cause mortality, adjusting for demographic, socioeconomic, and behavioral factors.

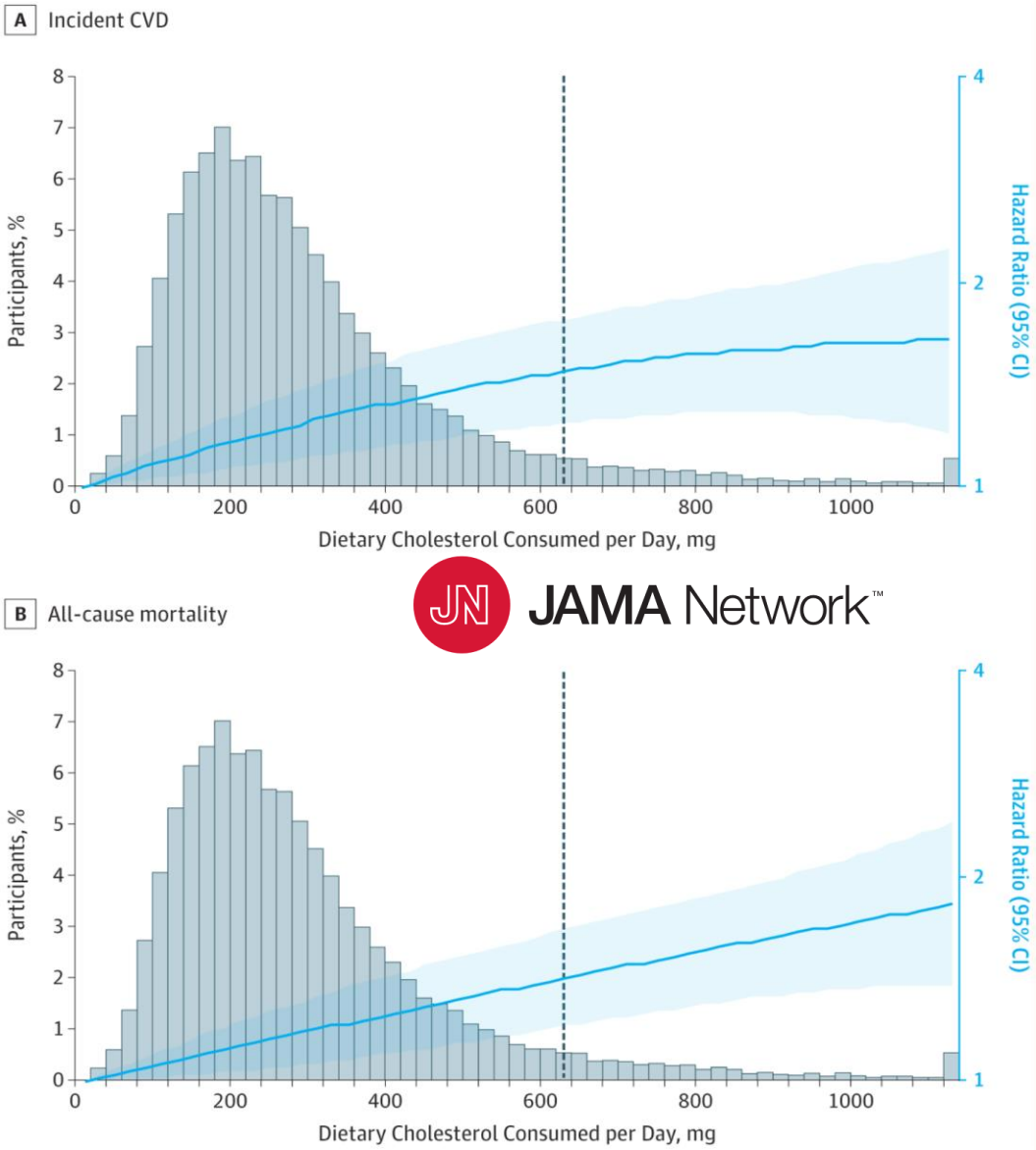
Editorial page 1055

Supplemental content

CME Quiz at jamanetwork.com/learning and CME Questions page 1102

UNIVERSITY OF LOUISVILLE

Associations of Dietary Cholesterol or Egg Consumption With Incident Cardiovascular Disease and Mortality



JAMA Network™

- Each additional 300 mg of dietary cholesterol consumed per day was significantly associated with higher risk of incident CVD (adjusted HR, 1.17 [95%CI, 1.09-1.26] and all-cause mortality (adjusted HR, 1.18 [95%CI, 1.10-1.26]
- Each additional half an egg consumed per day was significantly associated with higher risk of incident CVD and all-cause mortality.
- The associations between egg consumption and incident CVD were no longer significant after adjusting for dietary cholesterol consumption.

European Journal of Nutrition
https://doi.org/10.1007/s00394-021-02536-w

ORIGINAL CONTRIBUTION

. . . compared to low intake (> 0 ≤ 1 egg/week), eating > 4 eggs/week led to an increased risk of all-cause (Hazard ratio [HR] = 1.50; 95%CI 1.13–1.99), CVD (HR = 1.75; 1.07–2.87) and cancer mortality (HR = 1.52; 0.99–2.33). Similarly, an intake of 2–4 eggs/week was associated with higher all-cause (HR = 1.22; 1.01–1.46) and CVD mortality risk (HR = 1.43; 1.03–1.97). An increase of 1 egg per week was associated with higher mortality risk among high-risk individuals, such as those with hypertension and hyperlipidaemia. Dietary cholesterol explained about 43.0% and 39.3% (*p* values < 0.0001) of the association of eggs with all-cause and CVD mortality . . .

Methods Longitudinal analysis on 20,562 men and women aged ≥ 35y, free from cardiovascular disease (CVD) and cancer belonging to the Moli-sani Study cohort (enrolled 2005–2010) followed up for a median of 8.2 years.

Results In multivariable-adjusted analysis as compared to low intake (> 0 ≤ 1 egg/week), eating > 4 eggs/week led to an

Greater dietary cholesterol and egg consumption were associated with increased risk of overall and CVD mortality. HRs for each additional ***300 mg cholesterol*** intake per day were ***1.10 and 1.13 for overall and CVD mortality*** (respectively), and for each additional ***50 g egg*** consumed daily HRs were ***1.06 and 1.09***, respectively, for overall and CVD mortality (all P-values<0.0001) . . .

Conclusions: . . . greater dietary cholesterol and egg consumption were associated with increased risk of overall and CVD mortality. Our findings support restricted consumption of dietary cholesterol as a means to improve long-term health and longevity.

cardiovascular disease (CVD). Greater dietary cholesterol and egg consumption were associated with increased risk of overall and CVD mortality. HRs for each additional 300 mg cholesterol intake per day were 1.10 and 1.13 for overall and CVD mortality (respectively), and for each additional 50 g egg consumed daily HRs were 1.06 and 1.09, respectively, for overall and CVD mortality (all P-values<0.0001). After multivariable adjustment, higher serum total

JAMA Internal Medicine | Original Investigation

Association of Animal and Plant Protein Intake With All-Cause and Cause-Specific Mortality

Mingyang Song, MD, ScD; Teresa T. Fung, ScD; Frank B. Hu, MD, PhD; Walter C. Willett, MD, DrPH; Valter D. Longo, PhD; Andrew T. Chan, MD, MPH; Edward L. Giovannucci, MD, ScD

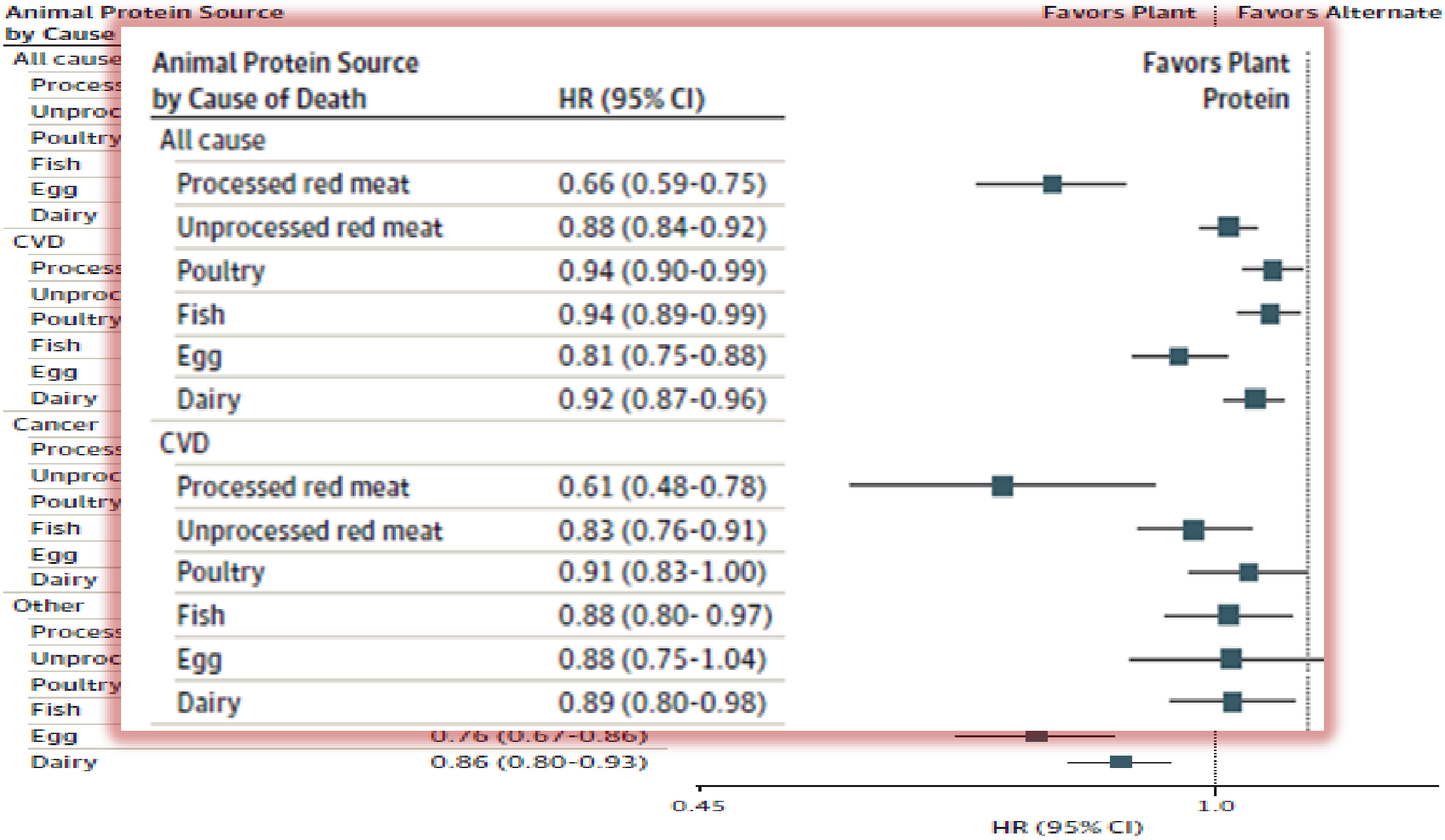
IMPORTANCE Defining what represents a macronutritionally balanced diet remains an open question and a high priority in nutrition research. Although the amount of protein may have specific effects, from a broader dietary perspective, the choice of protein sources will inevitably influence other components of diet and may be a critical determinant for the health outcome.

OBJECTIVE To examine the associations of animal and plant protein intake with the risk for mortality.

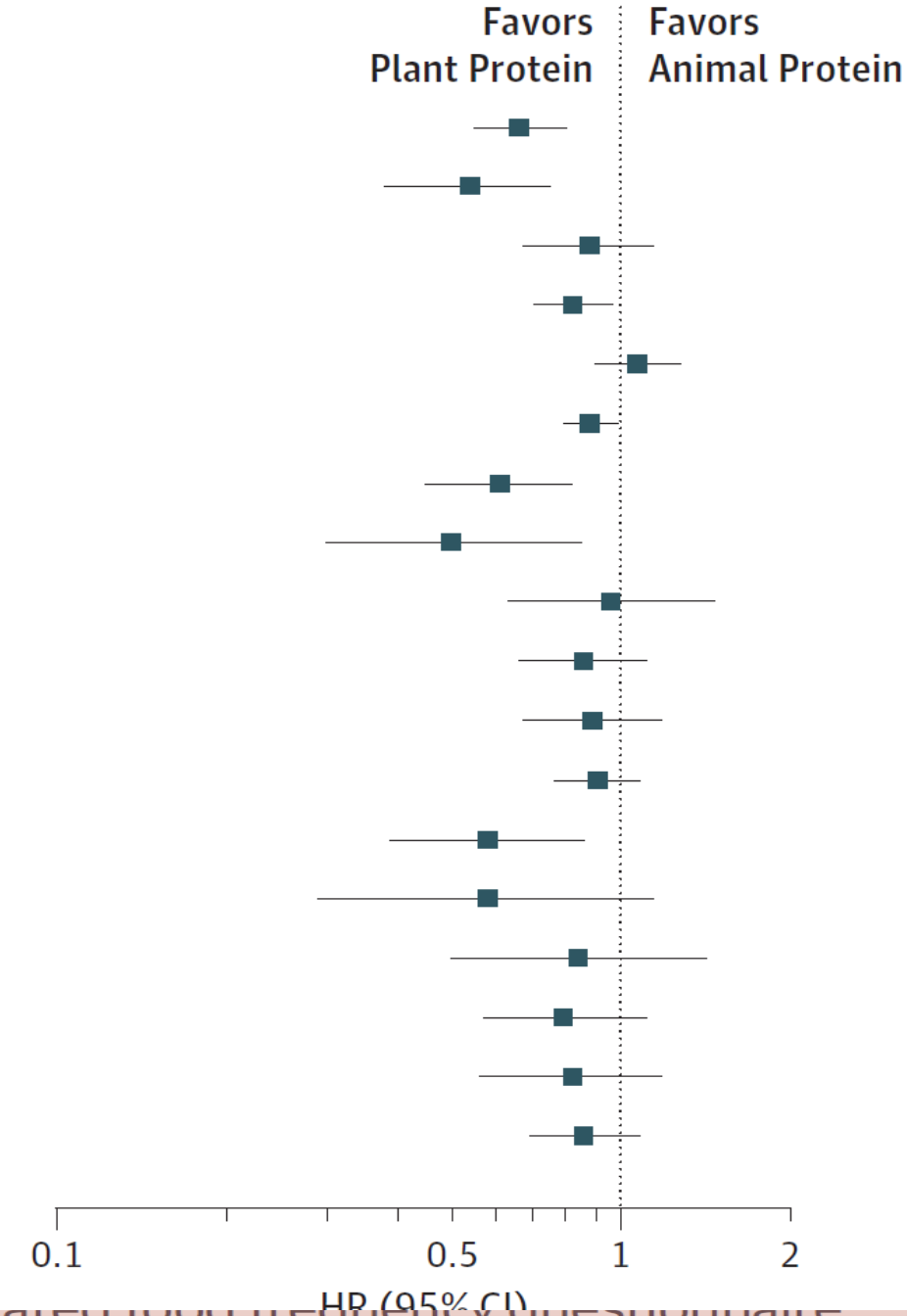
DESIGN, SETTING, AND PARTICIPANTS This prospective cohort study of US health care professionals included 131 342 participants from the Nurses' Health Study (1980 to end of follow-up on June 1, 2012) and Health Professionals Follow-up Study (1986 to end of follow-up on January 31, 2012). Animal and plant protein intake was assessed by regularly updated validated food frequency questionnaires. Data were analyzed from June 20, 2014, to January 18, 2016.

MAIN OUTCOMES AND MEASURES Hazard ratios (HRs) for all-cause and cause-specific mortality.

Figure. Risk for Mortality Associated With Replacement of 3% Energy From Various Animal Protein Sources With Plant Protein



Cause of Death	Protein Source	HR (95% CI)
All-cause	Red meat	0.66 (0.55-0.80)
	Processed meat	0.54 (0.38-0.75)
	Chicken	0.88 (0.67-1.14)
	Egg	0.82 (0.70-0.97)
	Dairy	1.07 (0.90-1.28)
	Fish	0.88 (0.79-0.99)
Cancer	Red meat	0.61 (0.45-0.82)
	Processed meat	0.50 (0.30-0.85)
	Chicken	0.96 (0.63-1.47)
	Egg	0.86 (0.66-1.11)
	Dairy	0.89 (0.67-1.18)
	Fish	0.91 (0.76-1.08)
Cardiovascular disease	Red meat	0.58 (0.39-0.86)
	Processed meat	0.58 (0.29-1.14)
	Chicken	0.84 (0.50-1.42)
	Egg	0.79 (0.57-1.11)
	Dairy	0.82 (0.56-1.18)
	Fish	0.86 (0.69-1.08)



Association Between Plant and Animal Protein Intake and Overall and Cause-Specific Mortality

Red meat protein				
Overall	0.87 (0.85-0.90)	<.001[c]	0.85 (0.81-0.88)	<.001[c]
Cancer	0.93 (0.88-0.98)	.004	0.89 (0.83-0.95)	<.001[c]
CVD	0.88 (0.83-0.93)	<.001[c]	0.82 (0.76-0.89)	<.001[c]
Heart disease	0.89 (0.84-0.94)	<.001[c]	0.84 (0.77-0.92)	<.001[c]
Egg protein				
Overall	0.76 (0.72-0.80)	<.001[c]	0.79 (0.73-0.85)	<.001[c]
Cancer	0.85 (0.78-0.93)	<.001[c]	0.83 (0.73-0.93)	.002[c]
CVD	0.74 (0.67-0.82)	<.001[c]	0.72 (0.63-0.83)	<.001[c]
Heart disease	0.76 (0.69-0.85)	<.001[c]	0.72 (0.62-0.85)	<.001[c]
Stroke	0.67 (0.52-0.88)	.003	0.75 (0.55-1.03)	.08
Respiratory disease	0.61 (0.50-0.74)	<.001[c]	0.66 (0.53-0.83)	<.001[c]
Infection	0.94 (0.71-1.25)	.66	0.80 (0.55-1.17)	.25
Injury and accident	0.71 (0.53-0.94)	.02	0.67 (0.43-1.05)	.08
Other causes combined	0.71 (0.63-0.80)	<.001[c]	0.92 (0.78-1.08)	.28

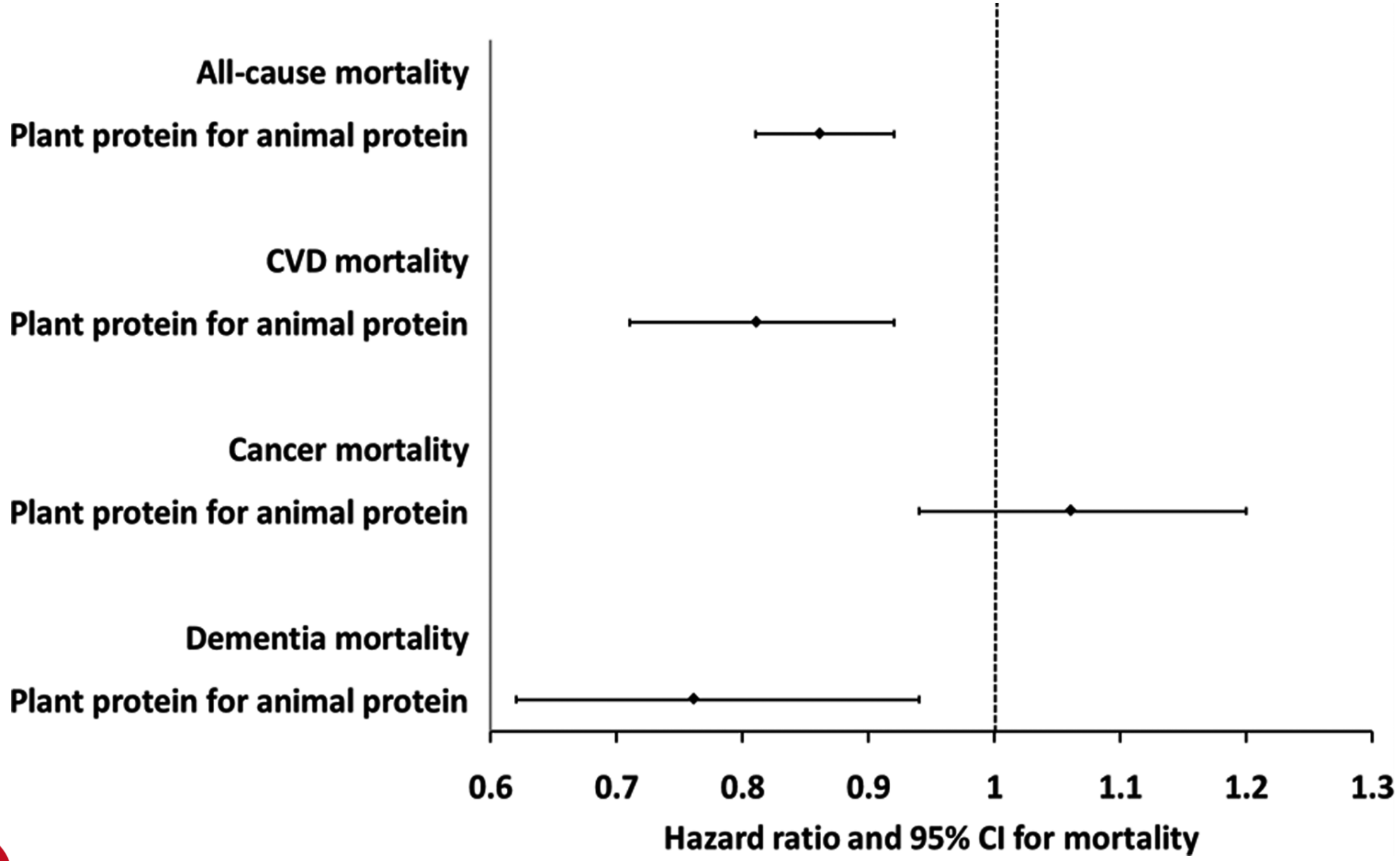
JAHA

"**plant protein intake was inversely associated with all-cause mortality** (hazard ratio [HR], 0.91 [0.86, 0.96]), cardiovascular disease mortality (HR, 0.88 [0.79, 0.97]), and dementia mortality (HR, 0.79 [0.67, 0.94]). Among major protein sources, comparing the highest with the lowest quintile of consumption, processed red meat (HR, 1.06 [1.01, 1.10]) or eggs (HR, 1.14 [1.10, 1.19]) was associated with higher risk of all-cause mortality. Unprocessed red meat (HR, 1.12 [1.02, 1.23]), eggs (HR, 1.24 [1.14, 1.34]), or dairy products (HR, 1.11 [1.02, 1.22]) was associated with higher risk of cardiovascular disease mortality. Egg consumption was associated with higher risk of cancer mortality (HR, 1.10 [1.02, 1.19]). Processed red meat consumption was associated with higher risk of dementia mortality (HR, 1.20 [1.05, 1.32])"

Dietary recommendations regarding protein intake have been focused on the amount of protein. However, such recommendations without considering specific protein sources may be simplistic and insufficient.

Methods and Results

We included 102 521 postmenopausal women enrolled in the Women's Health Initiative between 1993 and 1998, and



Yangbo Sun. Journal of the American Heart Association. Association of Major Dietary Protein Sources With All-Cause and Cause-Specific Mortality: Prospective Cohort Study, Volume: 10, Issue: 5, DOI: (10.1161/JAHA.119.015553)

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JACC CV HEALTH PROMOT

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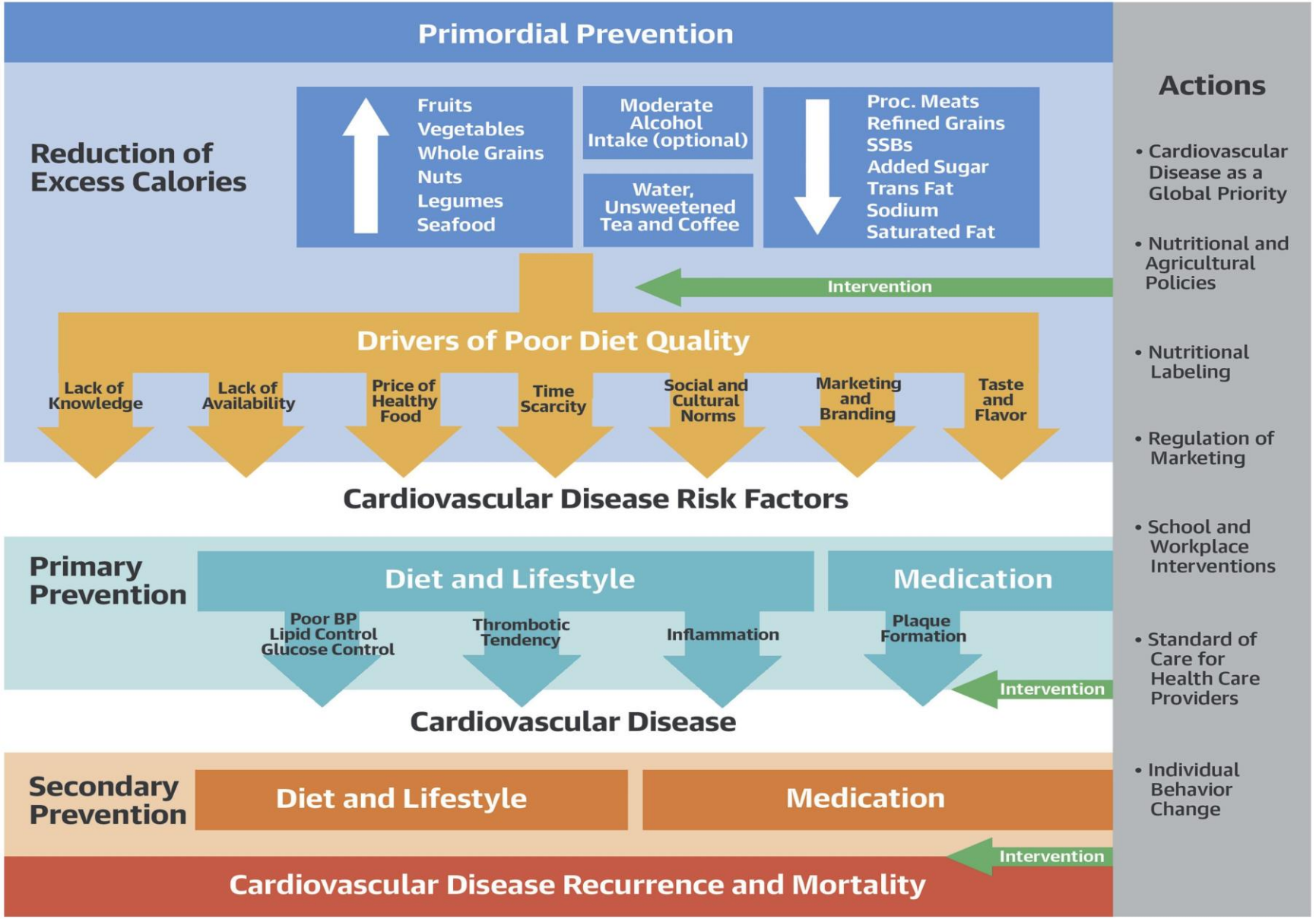
Reprint of: Car
Prevention by
JACC Health Promoti

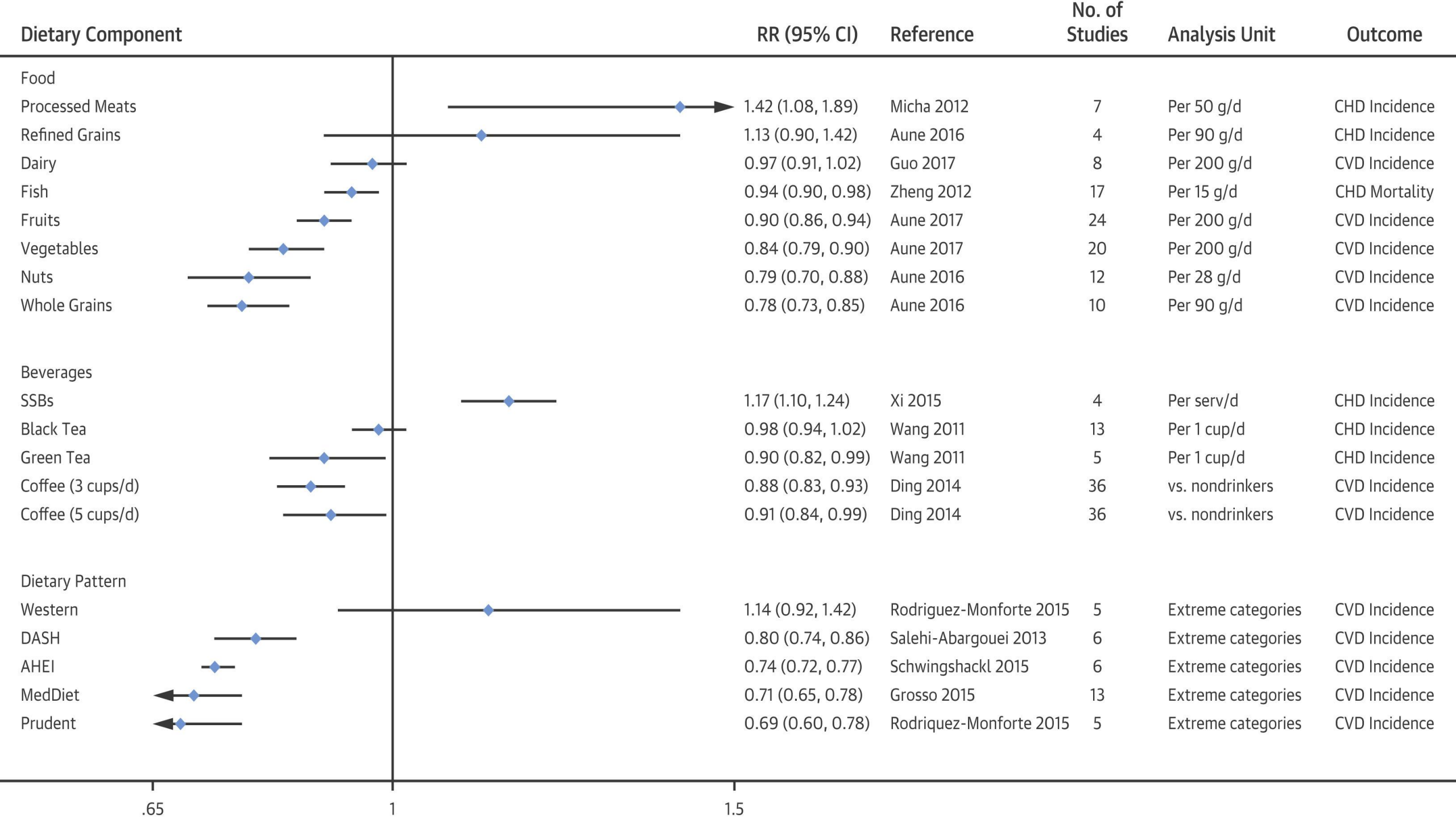
Edward Yu, ScD,[a,b] Vasanti S. Malik,

JACC JOURNAL CME/MOC/ECM

CENTRAL ILLUSTRATION: Flow Diagram of the Development of CVD and Possible Prevention by a Healthy Diet



Yu, E. et al. J Am Coll Cardiol. 2018;72(8):914–26.


Dietary Component
RR (95% CI)
Reference
No. of Studies
Analysis Unit
Outcome
Food
Processed Meats
1.42 (1.08, 1.89)
Micha 2012
7
Per 50 g/d
CHD Incidence
Refined Grains
1.13 (0.90, 1.42)
Aune 2016
4
Per 90 g/d
CHD Incidence
Dairy
0.97 (0.91, 1.02)
Guo 2017
8
Per 200 g/d
CVD Incidence
Fish
0.94 (0.90, 0.98)
Zheng 2012
17
Per 15 g/d
CHD Mortality
Fruits
0.90 (0.86, 0.94)
Aune 2017
24
Per 200 g/d
CVD Incidence
Vegetables
0.84 (0.79, 0.90)
Aune 2017
20
Per 200 g/d
CVD Incidence
Nuts
0.79 (0.70, 0.88)
Aune 2016
12
Per 28 g/d
CVD Incidence
Whole Grains
0.78 (0.73, 0.85)
Aune 2016
10
Per 90 g/d
CVD Incidence
Beverages
SSBs
1.17 (1.10, 1.24)
Xi 2015
4
Per serv/d
CHD Incidence
Black Tea
0.98 (0.94, 1.02)
Wang 2011
13
Per 1 cup/d
CHD Incidence
Green Tea
0.90 (0.82, 0.99)
Wang 2011
5
Per 1 cup/d
CHD Incidence
Coffee (3 cups/d)
0.88 (0.83, 0.93)
Ding 2014
36
vs. nondrinkers
CVD Incidence
Coffee (5 cups/d)
0.91 (0.84, 0.99)
Ding 2014
36
vs. nondrinkers
CVD Incidence
Dietary Pattern
Western
1.14 (0.92, 1.42)
Rodriguez-Monforte 2015
5
Extreme categories
CVD Incidence
DASH
0.80 (0.74, 0.86)
Salehi-Abargouei 2013
6
Extreme categories
CVD Incidence
AHEI
0.74 (0.72, 0.77)
Schwingshackl 2015
6
Extreme categories
CVD Incidence
MedDiet
0.71 (0.65, 0.78)
Grosso 2015
13
Extreme categories
CVD Incidence
Prudent
0.69 (0.60, 0.78)
Rodriquez-Monforte 2015
5
Extreme categories
CVD Incidence
.65
1
1.5

Dietary carbohydrate intake and mortality: a prospective cohort study and meta-analysis

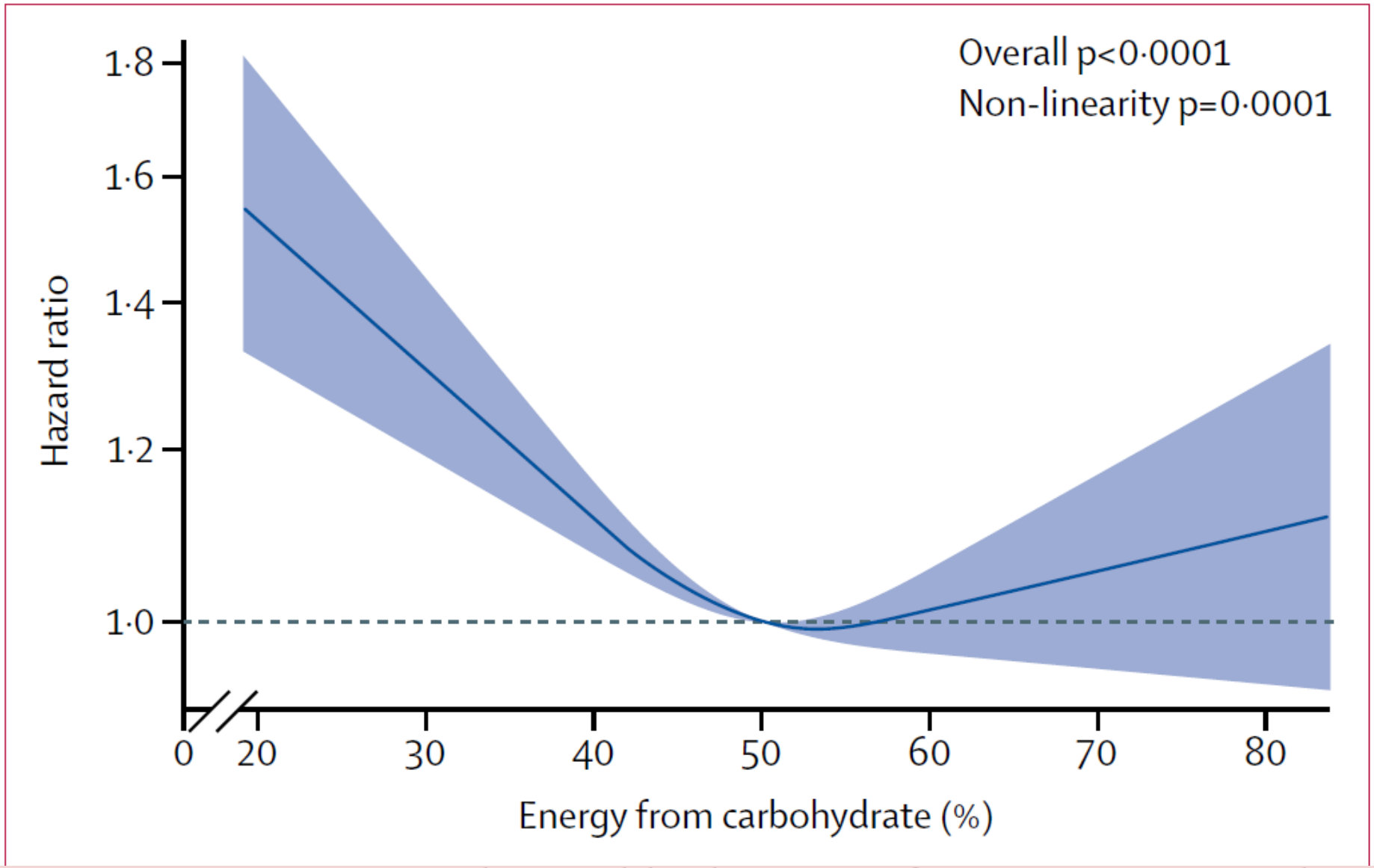
Sara B Seidelman ... *Willett, Scott D Solomon*

Summary

Background L... ntake, or both, are a popula... n mortality is controversial ... l-based fat and protein. We a...

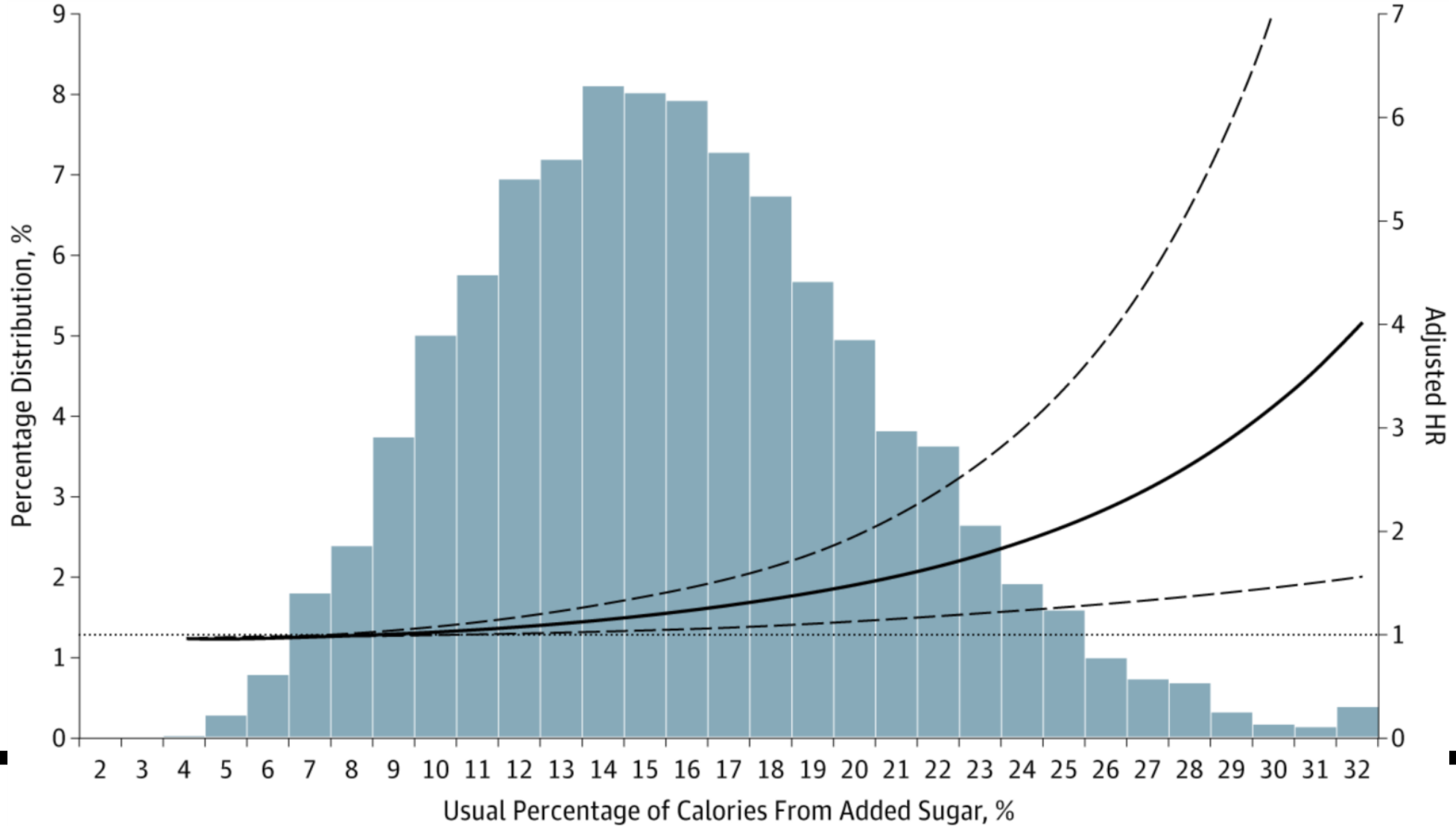
Methods We s... questionnaire at enrolment ... d who did not report extrem... cal per day for women). The... percentage of energy from ... nships in this cohort. We fu... reported from seven multin... n of animal or plant sources...

Findings Dur... nd there were 40 181 deaths ... as a U-shaped association b... and mortality: a percentage ... . In the meta-analysis of al... carbohydrate consumption ... ith a U-shaped association (p... –1·36 for high carbohydrate consumption). However, results varied by the source of macronutrients: mortality increased when



Added Sugar Intake and Cardiovascular Diseases Mortality Among US Adults

JAMA Intern Med. 2014;174(4):516-524. doi:10.1001/jamainternmed.2013.13563



Adjusted Hazard Ratio (HR) of the Usual Percentage of Calories From Added Sugar for Cardiovascular Disease Mortality Among US Adults 20 Years or Older: National Health and Nutrition Examination Survey Linked Mortality Files, 1988-2006Histogram of the distribution of usual percentage of calories from added sugar in the population. Lines show the adjusted HRs from Cox models. Midvalue of quintile 1 (7.4%) was the reference standard. The model was adjusted for age, sex, race/ethnicity, educational attainment, smoking status, alcohol consumption, physical activity level, family history of cardiovascular disease, antihypertensive medication use, Healthy Eating Index score, body mass index, systolic blood pressure, total serum cholesterol, and total calories. Solid line indicates point estimates; dashed lines indicate 95% CIs.

Healthful and Unhealthful Plant-Based Diets and the Risk of Coronary Heart Disease in U.S. Adults

Ambika Satija, ScD,[a] Shilpa N. Bhupathiraju,
Stephanie E. Chiuve, ScD,[a,f] JoAnn E. Manso
Kathryn M. Rexrode, MD, MPH,[i] Eric B. Rim

ABSTRACT

BACKGROUND Plant-based diets are recomm
plant foods are necessarily beneficial for healt

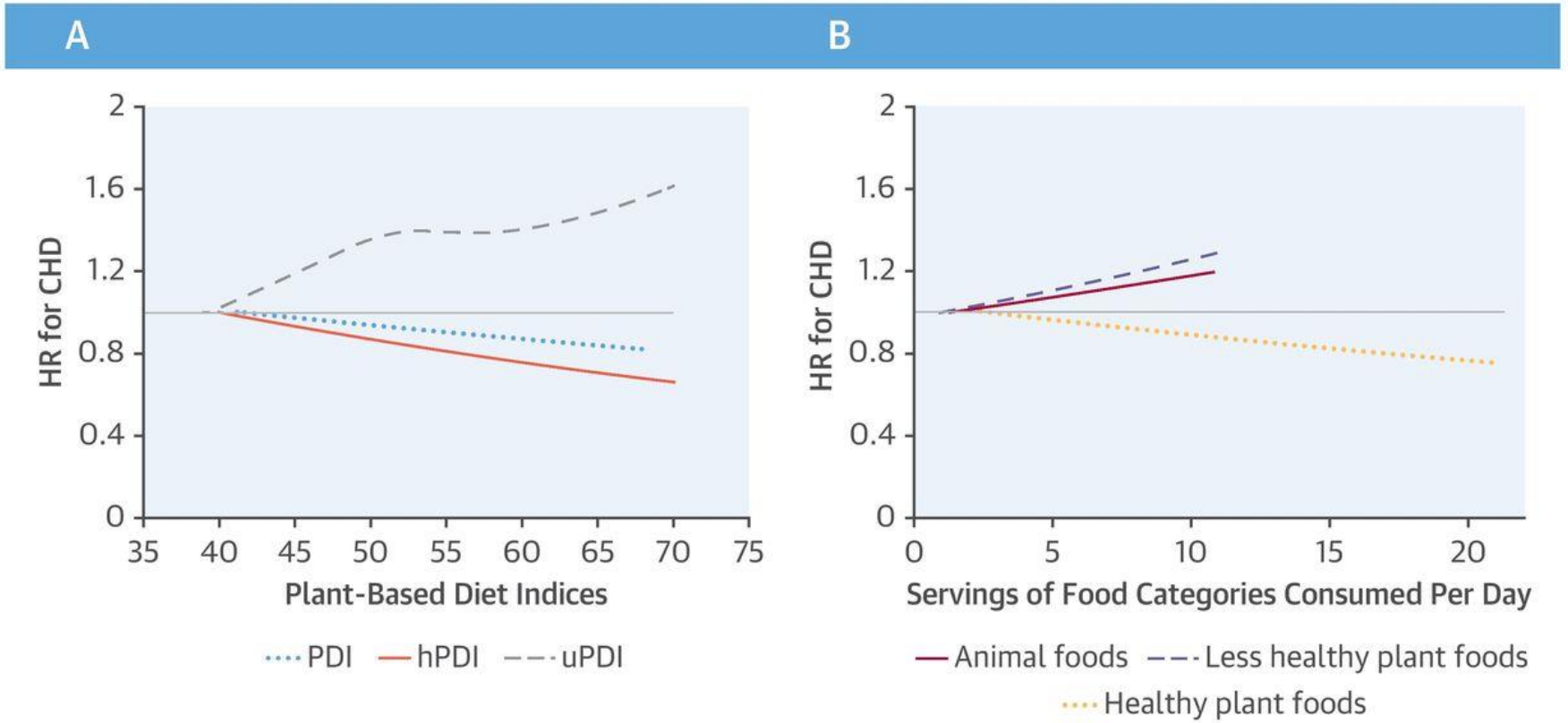
OBJECTIVES This study sought to examine a

METHODS We included 73,710 women in NHS
2013), and 43,259 men in Health Professionals
created an overall plant-based diet index (PDI)
by assigning positive scores to plant foods and
diet index (hPDI) where healthy plant foods (w
positive scores, whereas less-healthy plant foo
and animal foods received reverse scores. To c
plant foods and reverse scores to animal and h

RESULTS Over 4,833,042 person-years of foll
analysis, higher adherence to PDI was indepen
extreme deciles: 0.92; 95% confidence interval
for hDPI (HR: 0.75; 95% CI: 0.68 to 0.83; p tr
(HR: 1.32; 95% CI: 1.20 to 1.46; p trend <0.0

CONCLUSIONS Higher intake of a plant-base
lower CHD risk, whereas a plant-based diet inc
CHD risk. (J Am Coll Cardiol 2017;70:411–22)

CENTRAL ILLUSTRATION: Dose-Response Relationship of Plant-Based Diet Indices and Animal, Healthy Plant, and Less Healthy Plant Foods With CHD Incidence



Satija, A. et al. J Am Coll Cardiol. 2017;70(4):411–22.

Top 15 heart-healthy diets: DASH, Mediterranean come out on top

Michael Walter | *January 05, 2023* | *Heart Health*

U.S. News and World Report kicked off 2023 by sharing its annual list of the best diets for a person's health, and the Mediterranean diet came out on top for the sixth year in a row. The list represents a collaboration between more than 30 nutritionists, doctors and epidemiologists.

In a separate ranking looking specifically at heart-healthy diets, the DASH diet was a surprise choice for the No. 1 spot. The Mediterranean and Ornish diets were tied at No. 1 in the publication's 2022 rankings of the best heart-healthy diets. The DASH diet was No. 3.

What is the DASH diet?

DASH is an acronym for Dietary Approaches to Stop Hypertension. The DASH diet was designed to lower an individual's blood pressure and improve their overall heart health. It prioritizes foods heavy in potassium, calcium and magnesium, limiting foods high in sodium, saturated fat and added sugars. Fruits, vegetables, whole grains, fish, poultry and nuts are all parts of a well-balanced DASH diet.

UNIVERSITY OF LOUISVILLE

Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts

Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D., Jordi Salas-Salvadó, M.D., Ph.D., Maria-Isabel Covas, D.Pharm., Ph.D., Dolores Corella, D.Pharm., Ph.D., Fernando Arós, M.D., Ph.D., Enrique Gómez-Gracia, M.D., Ph.D., Valentina Ruiz-Gutiérrez, Ph.D., Miquel Fiol, M.D., Ph.D., José Lapetra, M.D., Ph.D., Rosa M. Lamuela-Raventos, D.Pharm., Ph.D., Lluís Serra-Majem, M.D., Ph.D., Xavier Pintó, M.D., Ph.D., Josep Basora, M.D., Ph.D., Miguel A. Muñoz, M.D., Ph.D., José V. Sorlí, M.D., Ph.D., J. Alfredo Martínez, D.Pharm., M.D., Ph.D., Montserrat Fitó, M.D., Ph.D., Alfredo Gea, D.Pharm., Ph.D., Miguel A. Hernán, M.D., Dr.P.H., Miguel A. Martínez-González, M.D., Ph.D., for the PREDIMED Study Investigators

N Engl J Med
Volume 378(25):e34
June 21, 2018

The NEW ENGLAND JOURNAL of MEDICINE

Table 3. Estimates of Cardiovascular Events, According to Intervention Group.*

End Point	Mediterranean Diet with EVOO (N=2543)	Mediterranean Diet with Nuts (N=2454)	Control Diet (N=2450)
No. of person-yr of follow-up	11852	10365	9763
Primary end point†			
No. of events	96	83	109
Incidence rate per 1000 person-yr (95% CI)	8.1 (6.6–9.9)	8.0 (6.4–9.9)	11.2 (9.2–13.5)
5-yr absolute risk — % (95% CI)‡	3.6 (2.8–4.5)	4.0 (3.1–5.0)	5.7 (4.6–6.9)
Secondary end points			
Stroke			
No. of events	49	32	58
Incidence rate per 1000 person-yr (95% CI)	4.1 (3.1–5.5)	3.1 (2.1–4.4)	5.9 (4.5–7.7)
5-yr absolute risk — % (95% CI)	1.7 (1.3–2.4)	1.5 (1.1–2.3)	3.0 (2.3–3.9)
Myocardial infarction			
No. of events	37	31	38
Incidence rate per 1000 person-yr (95% CI)	3.1 (2.2–4.3)	3.0 (2.0–4.2)	3.9 (2.8–5.3)
5-yr absolute risk — % (95% CI)	1.4 (1.0–2.1)	1.6 (1.1–2.3)	2.1 (1.5–2.9)
Death from cardiovascular causes			
No. of events	26	31	30
Incidence rate per 1000 person-yr (95% CI)	2.2 (1.4–3.2)	3.0 (2.0–4.2)	3.1 (2.1–4.4)
5-yr absolute risk — % (95% CI)	1.0 (0.6–1.5)	1.4 (0.9–2.1)	1.6 (1.1–2.3)
Death from any cause			
No. of events	118	116	114
Incidence rate per 1000 person-yr (95% CI)	10.0 (8.2–11.9)	11.2 (9.3–13.4)	11.7 (9.6–14.0)
5-yr absolute risk — % (95% CI)	4.4 (3.6–5.4)	5.4 (4.4–6.6)	5.4 (4.4–6.7)

A provegetarian food pattern and reduction in total mortality in the Prevención con Dieta Mediterránea (PREDIMED) study[1–4]

Miguel A Martínez-González, Ana Sánchez-Tainta, Dolores Corella, Jordi Salas-Salvadó, Emilio Ros, Fernando Arós, Enrique Gómez-Gracia, Miquel Fiol, Rosa M Lamuela-Raventós, Helmut Schröder, Jose Lapetra, Lluis Serra-Majem, Xavier Pinto, Valentina Ruiz-Gutierrez, and Ramon Estruch for the PREDIMED Group

ABSTRACT

Background: Vegetarian diets have been associated with reduced mortality. Because a pure vegetarian diet might not easily be embraced by many individuals, consuming preferentially plant-derived foods would be a more easily understood message. A provegetarian food pattern (FP) emphasizing preference for plant-derived foods might reduce all-cause mortality.

Objective: The objective was to identify the association between an a priori–defined provegetarian FP and all-cause mortality.

Design: We followed 7216 participants (57% women; mean age: 67 y) at high cardiovascular risk for a median of 4.8 y. A validated 137-item semiquantitative food-frequency questionnaire was administered at baseline and yearly thereafter. Fruit, vegetables, nuts, cereals, legumes, olive oil, and potatoes were positively weighted. Added animal fats, eggs, fish, dairy products, and meats or meat products were negatively weighted. Energy-adjusted quintiles were used to assign points to build the provegetarian FP (range: 12–60 points). Deaths were confirmed by review of medical records and the National Death Index.

Results: There were 323 deaths during the follow-up period (76 from cardiovascular causes, 130 from cancer, 117 for noncancer, noncardiovascular causes). Higher baseline conformity with the provegetarian FP was associated with lower mortality (multivariable-adjusted HR for ≥40 compared with <30 points: 0.59; 95% CI: 0.40, 0.88). Similar results were found with the use of updated information on diet (RR: 0.59; 95% CI: 0.39, 0.89).

Conclusions: Among omnivorous subjects at high cardiovascular risk, better conformity with an FP that emphasized plant-derived foods was associated with a reduced risk of all-cause mortality. This trial was registered at www.controlled-trials.com as ISRCTN35739639. *Am J Clin Nutr* 2014;100(suppl):320S–8S.

analysis of 5 prospective studies (10). Subsequently, a meta-analysis of 7 cohort studies confirmed a lower cardiovascular mortality in vegetarians, but inconsistent results for the association between vegetarian diets and death from any cause were found (11). More recently, a 5-y follow-up of the Adventist Health Study 2 cohort showed an overall association of vegetarian dietary patterns with lower mortality (12). Most available comparisons between vegetarians and nonvegetarians relied on a single measurement of diet at baseline, but dietary patterns may change over time and the length of exposure to vegetarianism may account for heterogeneity between results from different cohorts (10, 13, 14). In a pooled analysis of 5 cohort studies, vegetarian diets were inversely associated with CAD mortality, but when vegetarians were subdivided according to whether or not they had followed their current diet for ≥5 y, the cardiovascular benefits were confined only to those who had been vegetarian for >5 y (15).

Given that in most cultures the proportion of true vegetarians is low, it would be interesting to examine whether moderate or intermediate approaches to a predominantly plant-based FP relate

[1]From the Department of Preventive Medicine and Public Health, University of Navarra, Pamplona, Spain (MAM-G and AS-T); the CIBER Fisiopatologia de la Obesidad y Nutricion (DC, JS-S, ER, MF, RML-R, HS, JL, and RE), CIBER Epidemiologia y Salud Pública (HS), and the PREDIMED Network, Instituto de Salud Carlos III) (RE, JS-S, FA, EG-G, VR-G, RML-R, LS-M, XP, and MAM-G), Spain; the Department of Internal Medicine (RE) and the Lipid Clinic, Department of Endocrinology and Nutrition (ER), Institut d'Investigacions Biomediques August Pi Sunyer, Hospital Clinic de Barcelona, University of Barcelona, Barcelona, Spain; the Human Nutrition Department, Institut d'Investigacions Sanitaries Pere i Virgili, Universitat Rovira i Virgili, Reus (JS-S); the Cardiovascular and Nutrition Research Group, Institut de Recerca Hospital del Mar, Barcelona, Spain (HS); the Department of Preventive Medicine, University of Valencia, Valencia, Spain (DC); the

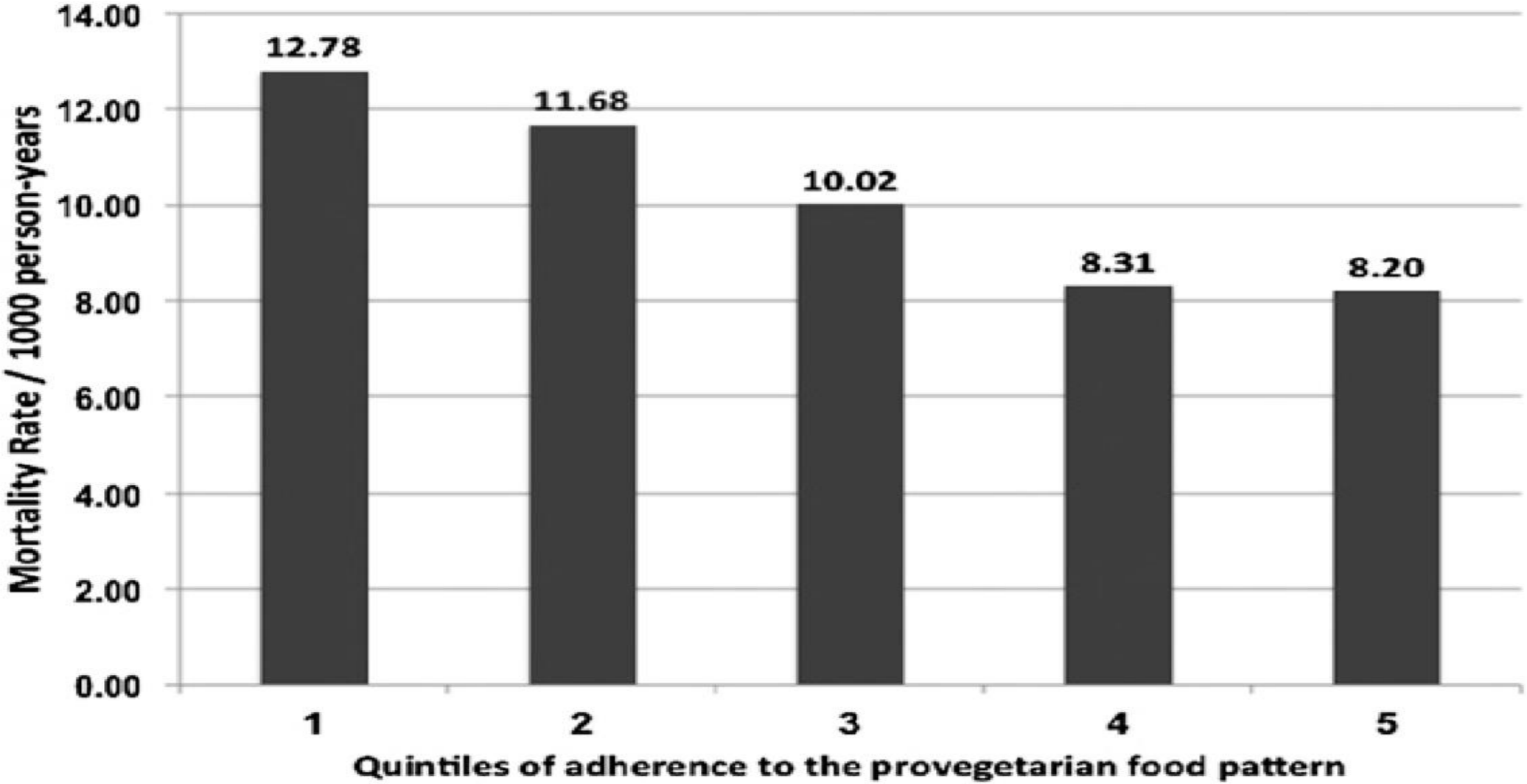


FIGURE 1. Absolute risk of death across baseline quintiles of the provegetarian food pattern: the Prevención con Dieta Mediterránea trial, 2003–2010. Quintile score limits were as follows for quintiles 1–5: <33, 33–35, 36–37, 38–40, >40, respectively.

Original Investigation

ONLINE FIRST

January 9, 2023

Healthy Eating Patterns and Risk of Total and Cause-Specific Mortality

Zhilei Shan, MD, PhD[1,2,3]; Fenglei Wang, PhD[3]; Yanping Li, MD, PhD[3]; et al

» Author Affiliations | Article Information

JAMA Intern Med. Published online January 9, 2023. doi:10.1001/jamainternmed.2022.6117

Key Points

Question Is there an association between Dietary Guidelines for Americans–recommended dietary patterns with total and cause-specific mortality?

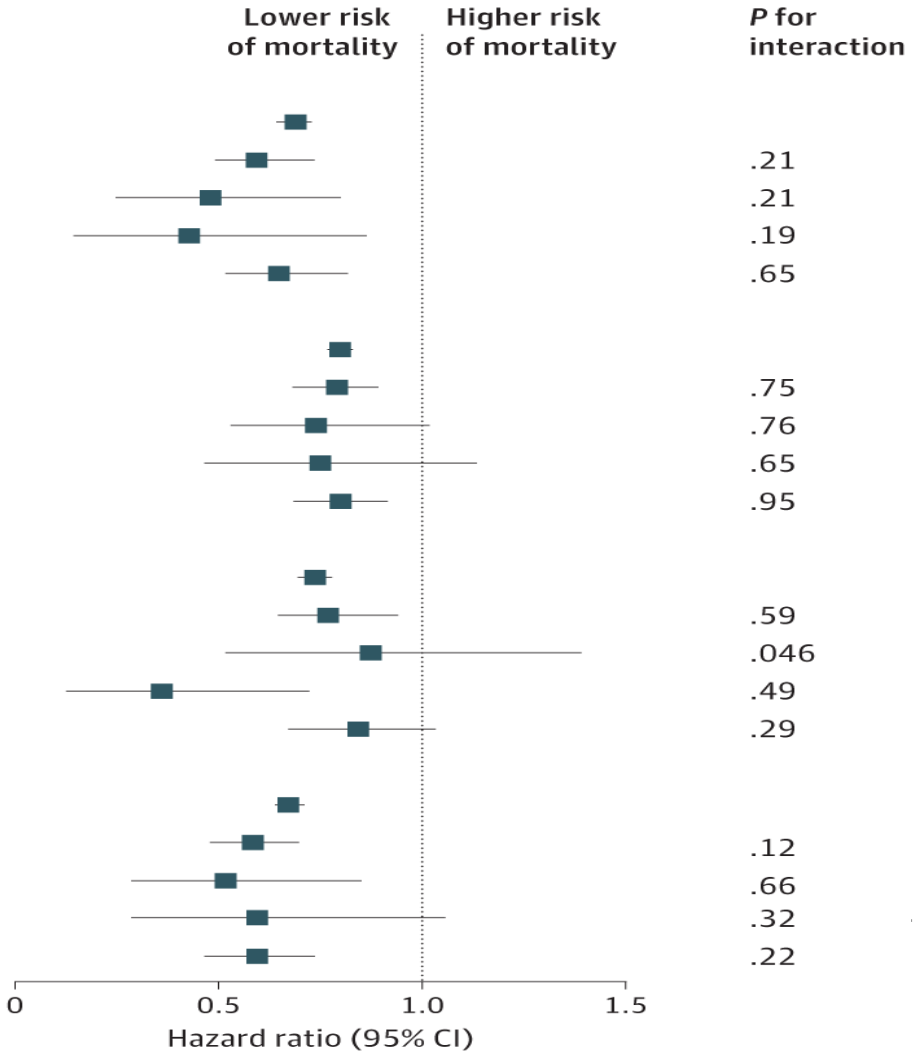
Findings In this cohort study of 75 230 women from the Nurses' Health Study (1984-2020) and 44 085 men from the Health Professionals Follow-Up Study (1986-2020), greater adherence to several healthy eating patterns was associated with a lower risk of death. These associations were consistent in different racial and ethnic groups, including Hispanic, non-Hispanic Black, and non-Hispanic White individuals.

JAMA Network™

From: **Healthy Eating Patterns and Risk of Total and Cause-Specific Mortality**

JAMA Intern Med. Published online January 09, 2023. doi:10.1001/jamainternmed.2022.6117

Healthy eating score, race and ethnicity	Cases/ person-years	Hazard ratio (95% CI)	*P* for interaction
HEI-2015			
Non-Hispanic White	29 291/2 197 702	0.75 (0.72-0.78)	
Racial and ethnic minority group	1972/145 442	0.68 (0.60-0.79)	.21
Hispanic	217/18 981	0.55 (0.33-0.89)	.21
Non-Hispanic Black	346/25 515	0.59 (0.41-0.84)	.19
Other	1409/100 946	0.72 (0.62-0.85)	.65
AMED			
Non-Hispanic White	29 291/2 197 702	0.84 (0.82-0.86)	
Racial and ethnic minority group	1972/145 442	0.83 (0.75-0.91)	.75
Hispanic	217/18 981	0.80 (0.58-1.10)	.76
Non-Hispanic Black	346/25 515	0.79 (0.63-1.01)	.65
Other	1409/100 946	0.84 (0.75-0.93)	.95
HPDI			
Non-Hispanic White	29 291/2 197 702	0.79 (0.76-0.82)	
Racial and ethnic minority group	1972/145 442	0.82 (0.72-0.95)	.59
Hispanic	217/18 981	0.50 (0.32-0.78)	.046
Non-Hispanic Black	346/25 515	0.90 (0.62-1.30)	.49
Other	1409/100 946	0.87 (0.74-1.02)	.29
AHEI			
Non-Hispanic White	29 291/2 197 702	0.74 (0.72-0.77)	
Racial and ethnic minority group	1972/145 442	0.67 (0.59-0.76)	.12
Hispanic	217/18 981	0.68 (0.44-1.04)	.66
Non-Hispanic Black	346/25 515	0.62 (0.44-0.88)	.32
Other	1409/100 946	0.68 (0.58-0.79)	.22



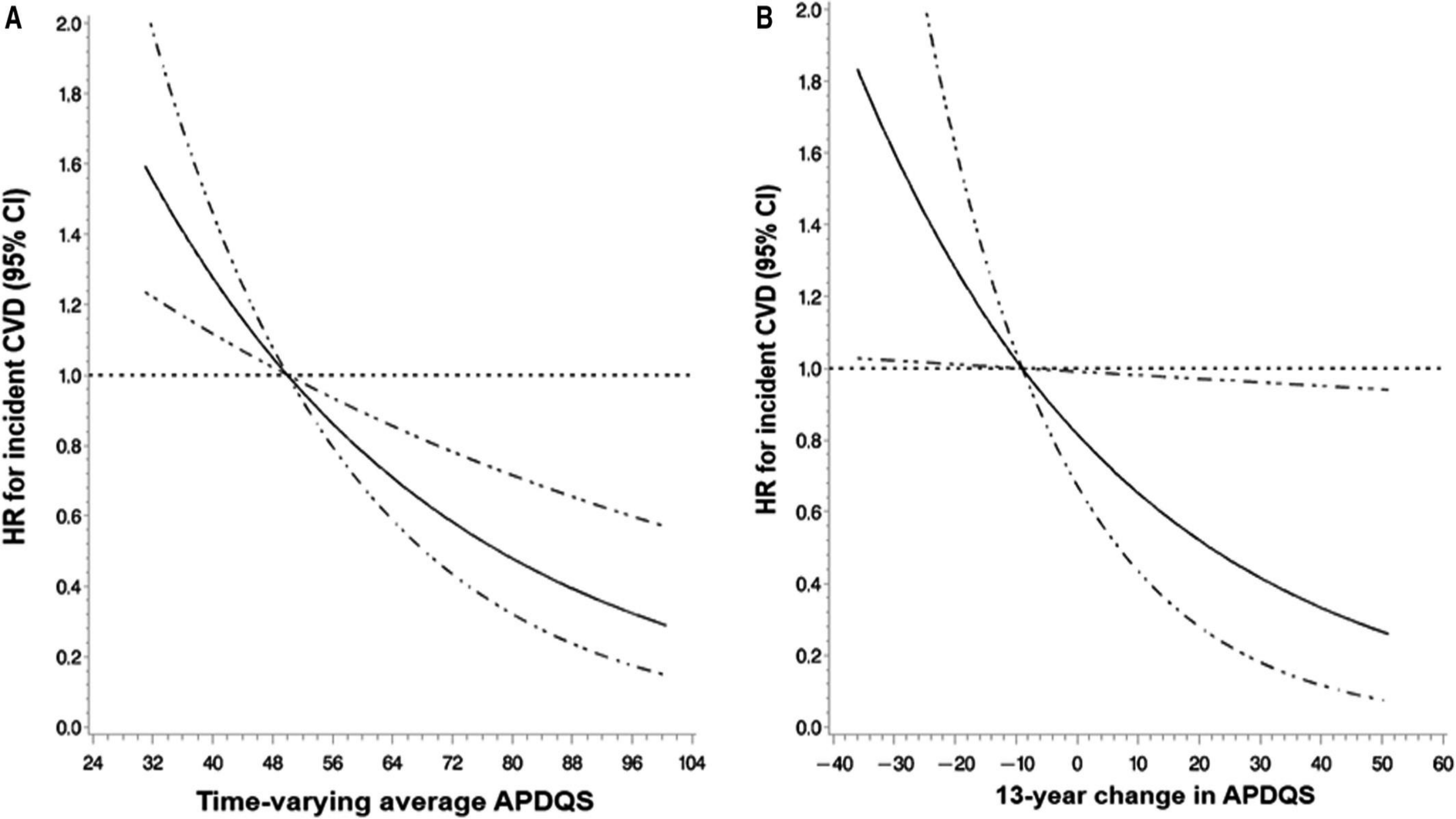
ORIGINAL RESEARCH

Plant-Centered Diet and Risk of Incident Cardiovascular Disease During Young to Middle Adulthood

Yuni Choi, PhD ; Nicole Larson, PhD; Lyn M. Steffen, PhD; Pamela J. Schreiner, PhD ; Daniel D. Gallaher, PhD; Daniel A. Duprez, MD, PhD; James M. Shikany, DrPH ; Jamal S. Rana, MD, PhD; David R. Jacobs Jr, PhD

Background— The association between diets that focus on plant foods and restrict animal products and cardiovascular disease (CVD) is inconclusive. We investigated whether cumulative intake of a plant-centered diet and shifting toward such a diet are associated with incident CVD.

Methods and Results— Participants were 4946 adults in the CARDIA (Coronary Artery Risk Development in Young Adults) prospective study. They were initially 18 to 30 years old and free of CVD (1985–1986, exam year [year 0]) and followed until 2018. Diet was assessed by an interviewer-administered, validated diet history. Plant-centered diet quality was assessed using the A Priori Diet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HR for incident CVD (95% CI)
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24
32
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48
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64
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80
88
96
104
Time-varying average APDQS
B
HR for incident CVD (95% CI)
2.0
1.8
1.6
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1.2
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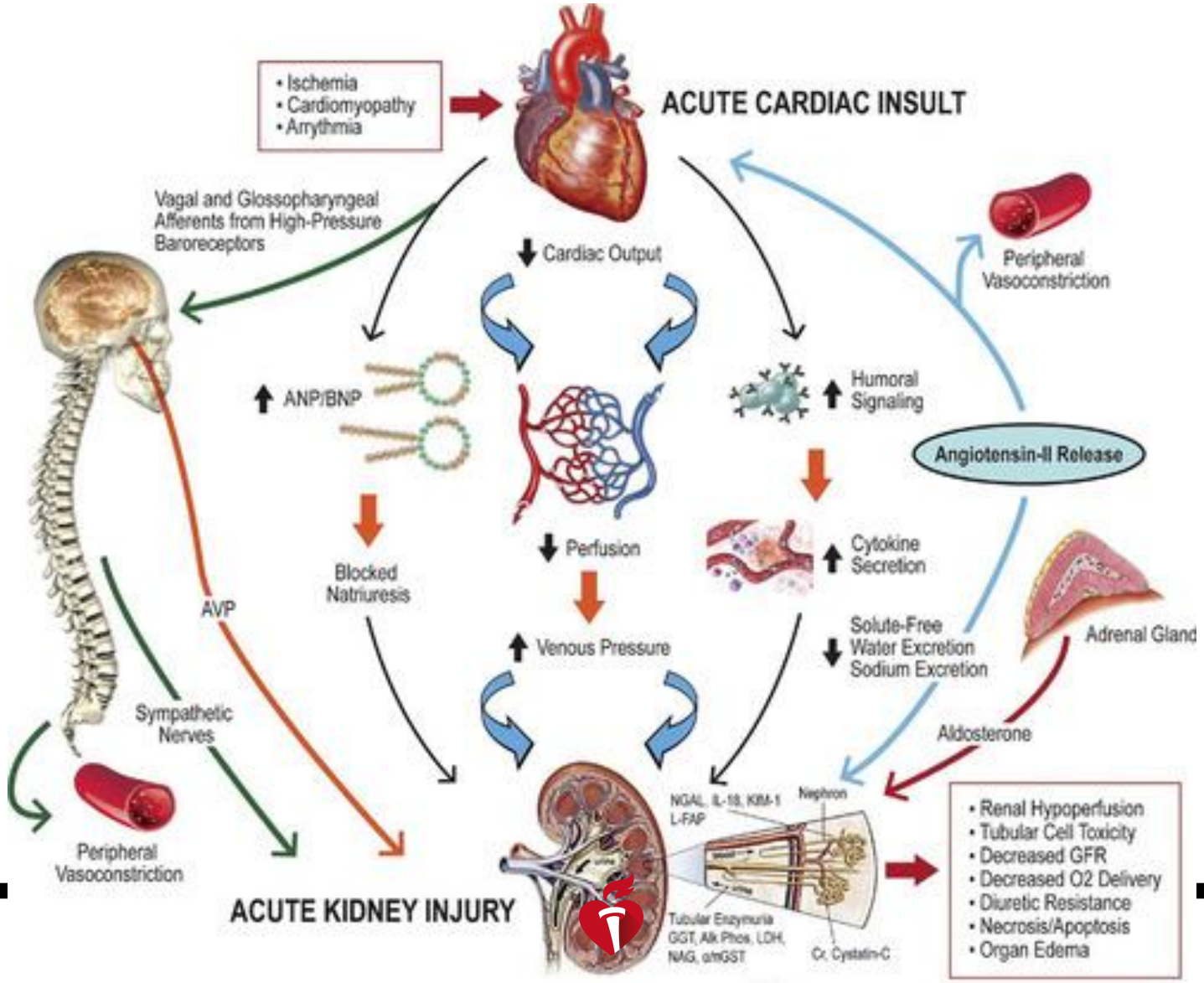
13-year change in APDQS

Cardiorenal Disease



Janani Rangaswami. Circulation. Cardiorenal Syndrome: Classification, Pathophysiology, Diagnosis, and Treatment Strategies: A Scientific Statement From the American Heart Association, Volume: 139, Issue: 16, Pages: e840-e878, DOI: (10.1161/CIR.0000000000000664)

Alvirdizadeh *et al. BMC Nephrology* (2020) 21:489
https://doi.org/10.1186/s12882-020-02079-y

BMC Nephrology

RESEARC Access

A pros protein the ris

Sevda Alvirdiza

Abstract

Background: nging issue. This stu otein intake with th

Methods: Thi and Glucose Study questionnaire (FFQ). Total protein content, plant protein, and animal protein of each participant were calculated. Glomerular filtration rate (GFR) less than 60 mL / min / 1.73 m^2 has been considered as the definition of CKD. Odds Ratio (OR) was calculated using logistic regression to show the association between the risk of incident CKD and dietary exposures.

. . . After adjustment for confounders, compared with the lowest tertile of plant protein consumption, OR of incident CKD in the highest tertile was 0.29 (95% confidence interval [95% CI] 0.15 to 0.55) with a significant trend (P for trend < 0.001).

The results of this study confirmed an ***inverse association between plant protein intake and the risk of incident CKD***, which demonstrates the protective role of plant-based protein in a diet on kidney function.

Red M

Quan-Lan
Khuan Yew

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Epidemiology

ABSTRACT

Randomized
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risk of ESRD
Chinese Hea
45–74 years
food freque
cases of ESR
with the low
confidence interval [95% CI], 1.05 to 1.46), but the dose-dependent association across the quartiles was not statistically significant (P_{trend}=0.16). Red meat intake strongly associated with ESRD risk in a dose-dependent manner (hazard ratio for highest quartile versus lowest quartile,1.40 [95% CI, 1.15 to 1.71; P_{trend}<0.001]). Intake of poultry, fish, eggs, or dairy products did not associate with risk of ESRD. In substitution analysis, replacing one serving of red meat with other food sources of protein associated with a maximum relative risk reduction of 62.4% (95% CI, 33.1 to 78.9; P<0.01). Our study shows that red meat intake may increase the risk of ESRD in the general population and substituting alternative sources of protein may reduce the incidence of ESRD.

"... Randomized controlled trials suggest that protein restriction may retard the progression of CKD toward ESRD . . .

. . ***risk in a dose- dependent manner*** (hazard ratio for highest quartile versus lowest quartile, ***1.40*** [95% CI, 1.15 to 1.71; Ptrend,0.001]). Intake of poultry, fish, eggs, or dairy products did not associate with risk of ESRD. . . ."

Circulation Research
Volume 116, Issue 3, 30 January 2015, Pages 448-455
https://doi.org/10.1

American Heart Association.

CLINICAL

Gut Mic … de (TMAO) … nt of Renal Ir… Kidney …

W.H. Wilson … Brendan Agatisa-Boyl…

"… Within CKD subjects, higher (fourth versus first quartile) plasma ***TMAO level was associated with a 2.8-fold*** increased mortality risk … TMAO provided significant incremental prognostic value … Among non-CKD subjects, elevated TMAO levels portend poorer prognosis within cohorts of high and low cystatin C …

Plasma TMAO levels are both elevated in patients with CKD and portend ***poorer long-term survival***. …"

RATIONALE: Trimethylamine-*N*-oxide (TMAO), a gut microbial-dependent metabolite of dietary choline, phosphatidylcholine (lecithin), and L-carnitine, is elevated in chronic kidney diseases (CKD) and associated with coronary artery disease pathogenesis.

Current evidence suggests that promoting the ***adoption of plant-based diets has few risks but potential benefits*** for the primary prevention of CKD, as well as for delaying progression in patients with CKD G3–5. These diets might also help to ***manage and prevent some of the symptoms and metabolic complications of CKD***. We suggest that restriction of plant foods as a strategy to prevent hyperkalaemia or undernutrition should be individualized to avoid depriving patients with CKD of these potential beneficial effects of plant-based diets.

diet. Plant nutrients and plant-based diets could have beneficial effects in patients with CKD: increased fibre intake shifts the gut microbiota towards reduced production of uraemic

Journal of Renal Nutrition
NATIONAL KIDNEY FOUNDATION
INTERNATIONAL SOCIETY OF RENAL NUTRITION AND METABOLISM

ORIGINAL

Soy Pr
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Ludmila Y
Marina V.

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"... Substitution of animal protein with ***soy protein*** in diet of patients with CKD to a greater extent delayed the ***decrease in eGFR*** (−5.9% vs −11.3%, P = .048), the increase in ***left ventricle hypertrophy*** (+4.7% vs +12.3%, P = .042), as well as the increase in central ***systolic blood pressure*** (+2.6% vs +13.0%, P = .021), augmentation index (+7.6% vs +23.3%, P = .010), slowed down the ***decrease in lean body mass*** in males (+0.9% vs −11.2%, P = .017) and females (−1.8% vs −10.3%, P = .024), ***increase in phosphorus*** (−10.3% vs +13.0%, P = .029), ***cholesterol*** (−10.7% vs −3.4% P = .047) and ***urea*** (+6.3% vs +19.6%, P = .035) serum levels. . . . ."

The study included 85 CKD 3b-4 stages G3b-4 patients, compliant to LPD (0.6 g of protein/kg of body weight) + KA (1

National Kidney Foundation®

PLANT-BASED DIET AND KIDNEY HEALTH

Eating more plant-based foods such as vegetables and grains in place of animal-based foods such as red meat may help prevent and slow the progression of chronic kidney disease, Type 2 diabetes, high blood pressure, and heart disease.

The Benefits of Plant-Based Diets on Kidney Health

Studies show that eating whole grains, nuts, fruits and vegetables is one of the most important ways to keep kidneys healthy.

- The Right Foods Help Keep You Healthy and Fight Chronic Disease
- Plant-Based Diets Help Prevent Kidney

A Guide to Plant-Based Diets

Starting a plant-based diet does not mean that you need to become a vegetarian and cut all sources of animal protein from your diet.

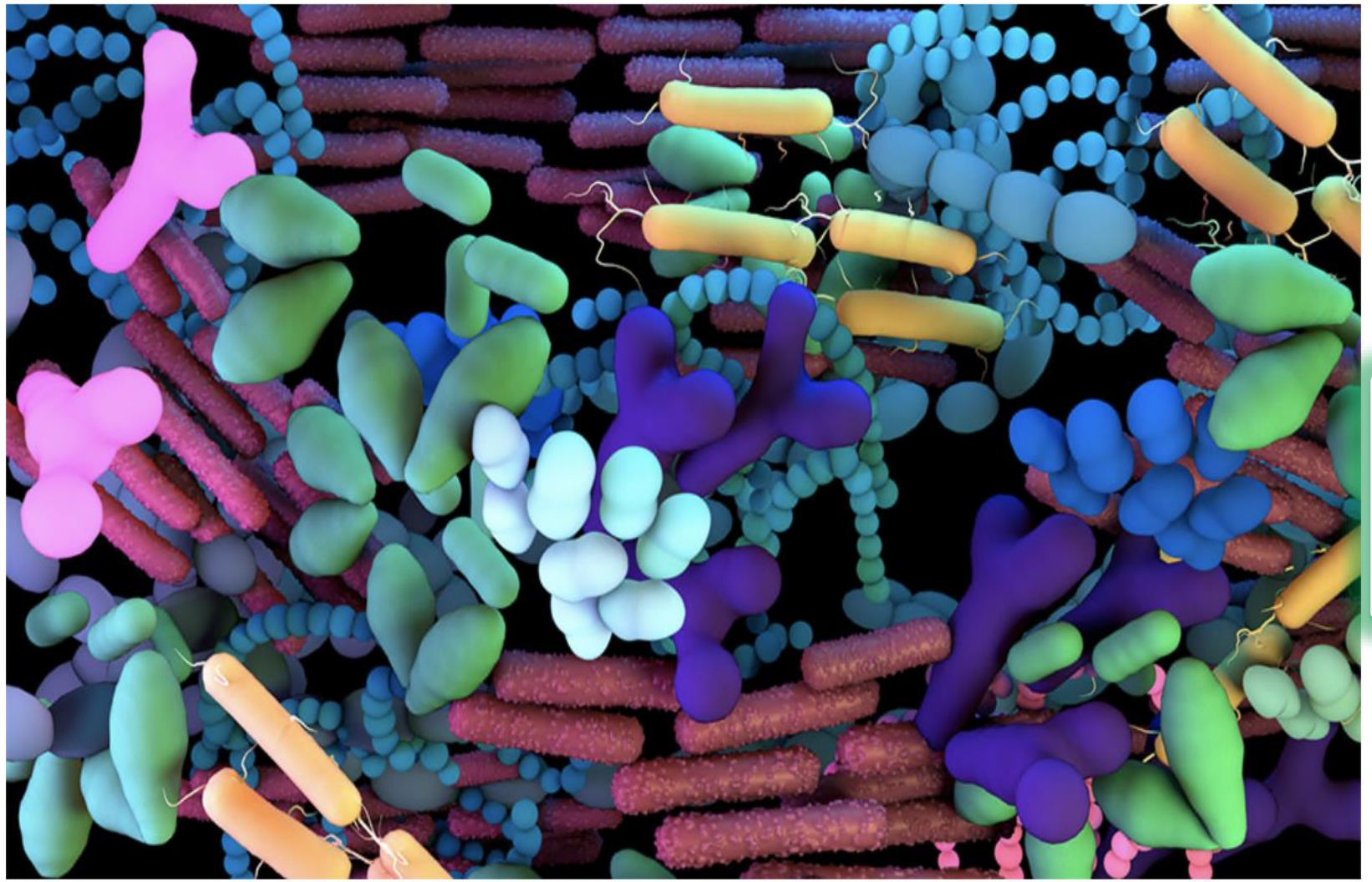
- What is a Plant-Based Diet, and Is It Good for Your Kidneys?
- The Beginner's Guide to Starting a Plant-Based Diet

The Role of Plant-Based Diets for Patients With Kidney Disease

With guidance from a registered dietitian nutritionist (RDN), a carefully planned plant-based diet may be helpful in the setting of kidney disease, depending on a patient's specific needs.

- How Much Plant-Based Protein Can You

Microbiome and COVID Illness



The gut microbiome may play a role in COVID-19 severity, a lab study suggested.

"Do we have the guts to go vegan?"

https://gut.bmj.com/content/early/2021/01/04/gutjnl-2020-323020

Original research

Gut microbiota composition reflects disease severity

"Associations between gut microbiota composition, levels of ***cytokines and inflammatory markers*** in patients with COVID-19 suggest that the gut microbiome is involved in the magnitude of COVID-19 severity possibly via modulating host immune responses. Furthermore, the gut microbiota dysbiosis after disease resolution could contribute to, highlighting a need to understand how gut ***microorganisms are involved in inflammation and COVID-19***."

gutjnl-2020-323020).

For numbered affiliations see end of article.

Correspondence to

suggesting that the GI tract is involved in this disease. We investigated whether the gut microbiome is linked to disease severity in patients with COVID-19, and whether perturbations in microbiome composition, if any, resolve with clearance of the SARS-CoV-2 virus.

- SARS-CoV-2 primarily infects the respiratory tract, however, pathophysiology of COVID-19 can be attributed to aberrant immune responses in clearing the virus.
- Several lines of evidence such as replication of

BMJ Nutrition, Prevention & Health

Plant-based diets, pescatarian diets and COVID-19 severity: a population-based case–control study in six countries

Hyunju Kim,[1,2] Casey M Rebholz,[1,2] Sheila Hegde,[3] Christine LaFiura,[4] Madhunika Raghavan,[4] John F Lloyd,[5] Susan Cheng,[5] Sara B Seidelmann[6,7]

To cite: Kim H, Rebholz CM, Hegde S, *et al*. Plant-based diets, pescatarian diets and COVID-19 severity: a population-based case–control study in six countries. *BMJ Nutrition, Prevention & Health* 2021;**4**:e000272. doi:10.1136/bmjnph-2021-000272

► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/bmjnph-2021-000272).

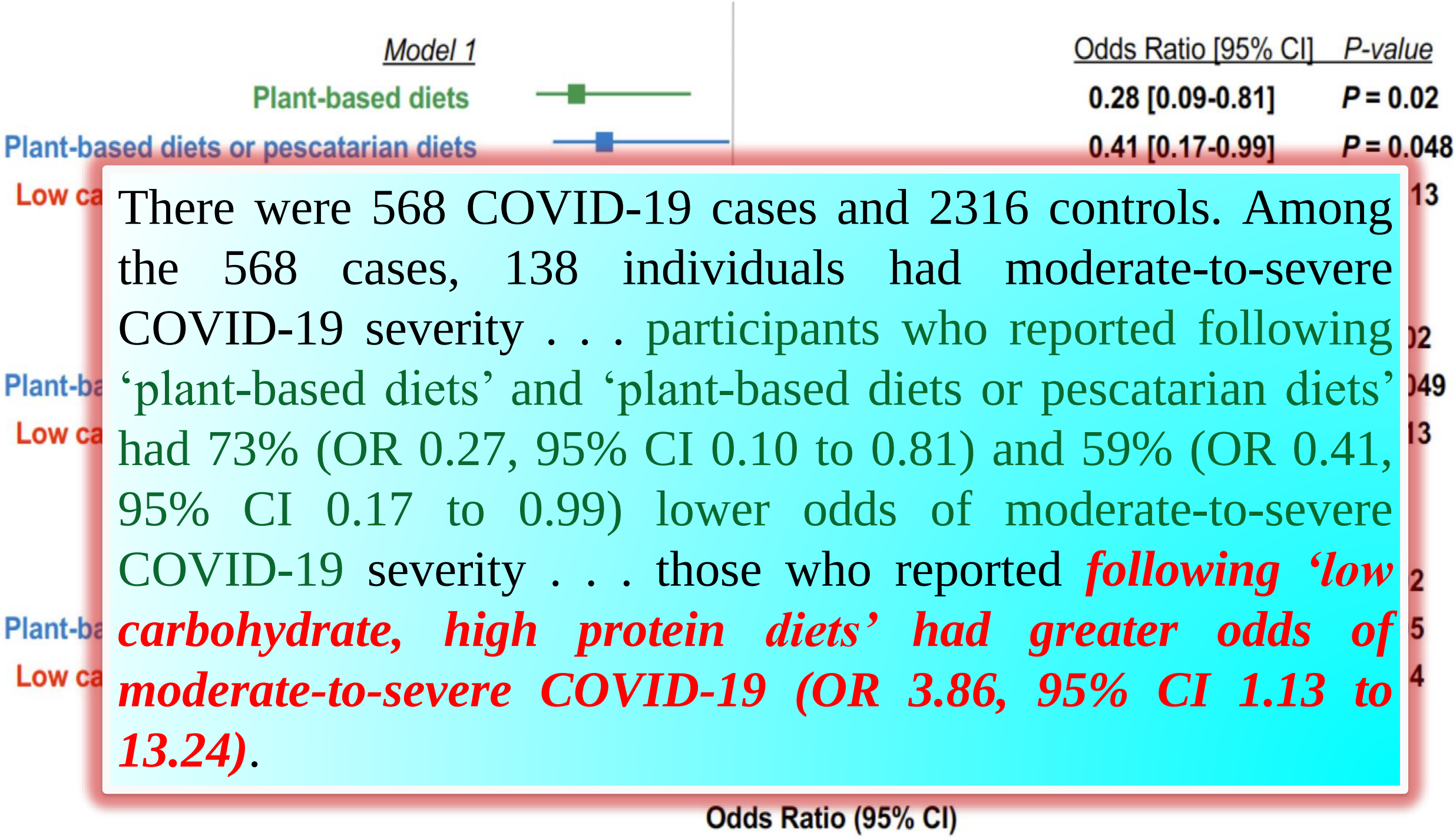
ABSTRACT

Background Several studies have hypothesised that dietary habits may play an important role in COVID-19 infection, severity of symptoms, and duration of illness. However, no previous studies have investigated the association between dietary patterns and COVID-19.

Methods Healthcare workers (HCWs) from six countries (France, Germany, Italy, Spain, UK, USA) with substantial exposure to COVID-19 patients completed a web-based survey from 17 July to 25 September 2020. Participants provided information on demographic characteristics, dietary information, and COVID-19 outcomes. We used multivariable logistic regression models to evaluate the association between self-reported diets and COVID-19

What this paper adds

- In 2884 front-line healthcare workers from six countries (France, Germany, Italy, Spain, UK, USA), individuals who reported following plant-based diets and plant-based diets or pescatarian diets that were higher in vegetables, legumes and nuts, and lower in poultry and red and processed meats, had 73% and 59% lower odds of moderate-to-severe COVID-19, respectively.
- Plant-based diets or pescatarian diets are healthy dietary patterns, which may be considered for protection against severe COVID-19.



There were 568 COVID-19 cases and 2316 controls. Among the 568 cases, 138 individuals had moderate-to-severe COVID-19 severity . . . participants who reported following 'plant-based diets' and 'plant-based diets or pescatarian diets' had 73% (OR 0.27, 95% CI 0.10 to 0.81) and 59% (OR 0.41, 95% CI 0.17 to 0.99) lower odds of moderate-to-severe COVID-19 severity . . . those who reported ***following 'low carbohydrate, high protein diets' had greater odds of moderate-to-severe COVID-19 (OR 3.86, 95% CI 1.13 to 13.24)***.

UNIVERSITY OF LOUISVILLE

The Answer

2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease

Donna K. Arnett, PhD, MSPH, FAHA, *Co-Chair*

Roger S. Blumenthal, MD, FACC, FAHA, *Co-Chair*

Michelle A. Albert, MD, MPH, FAHA*
Andrew B. Buroker, Esq†
Zachary D. Goldberger, MD, MS, FACC, FAHA‡
Ellen J. Hahn, PhD, RN*
Cheryl D. Himmelfarb, PhD, RN, ANP, FAHA*
Amit Khera, MD, MSc, FACC, FAHA*
Donald Lloyd-Jones, MD, SCM, FACC, FAHA*
J. William McEvoy, MBBCh, MEd, MHS*
Erin D. Michos, MD, MHS, FACC, FAHA*
Michael D. Miedema, MD, MPH*
Daniel Muñoz, MD, MPA, FACC*
Sidney C. Smith, Jr, MD, MACC, FAHA*
Salim S. Virani, MD, PhD, FACC, FAHA*
Kim A. Williams, Sr, MD, MACC, FAHA*
Joseph Yeboah, MD, MS, FACC, FAHA*
Boback Ziaeian, MD, PhD, FACC, FAHA§

Healthy Eating

Fitness

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Sleep

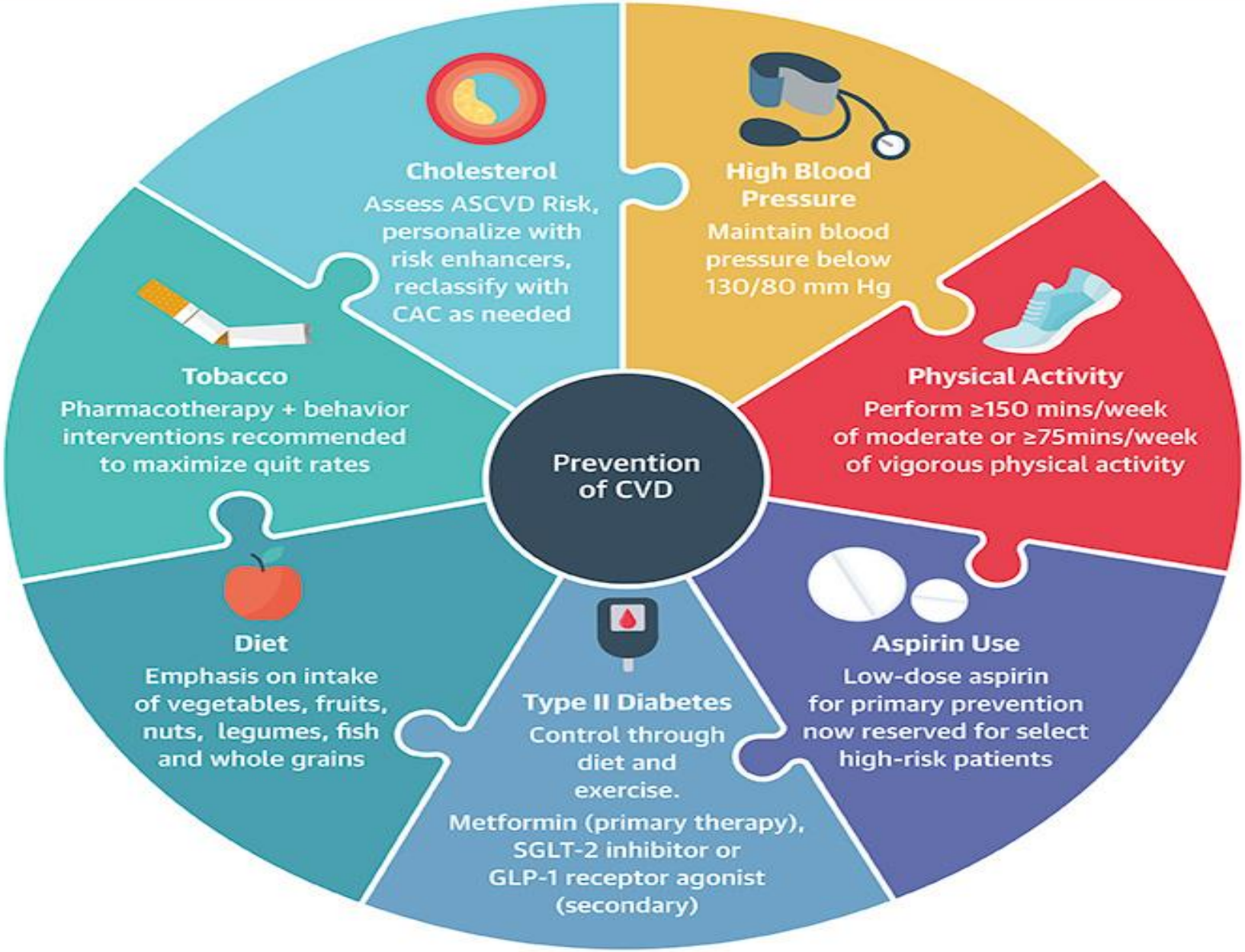
Losing Weight

Cholesterol

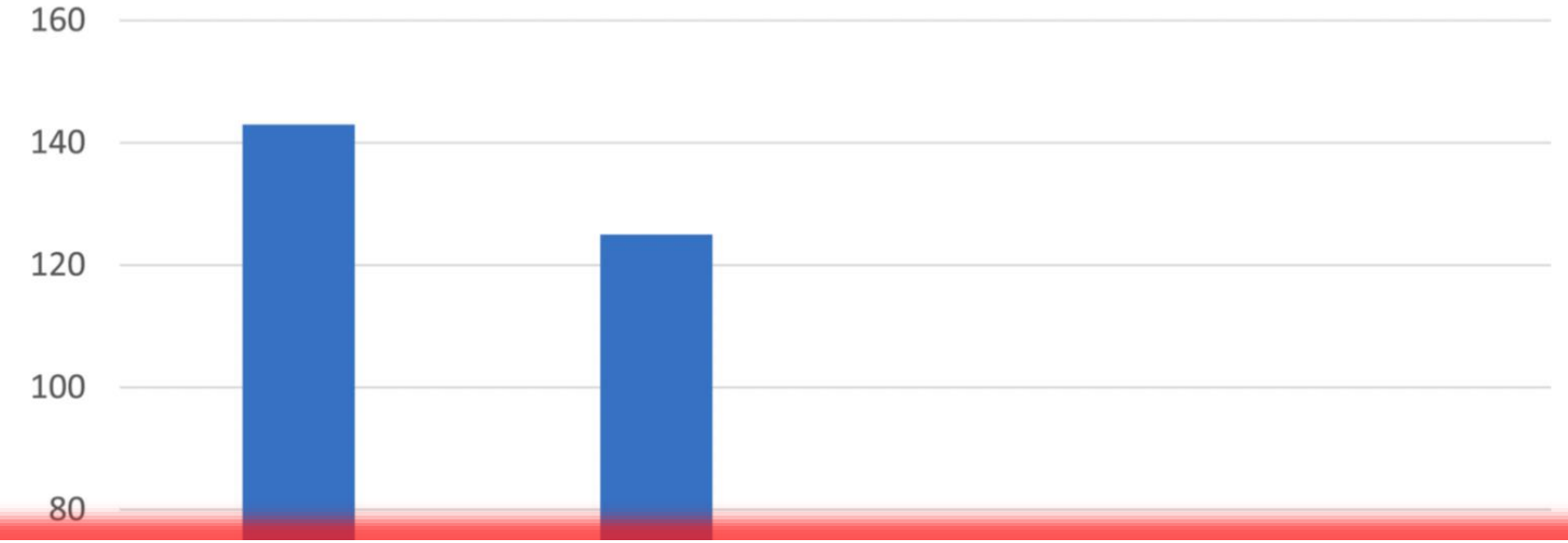
Diabetes

Blood Pressure

Primary Prevention: Lifestyle Changes and Team-Based Care



DOI: 10.1016/j.jacc.2019.03.010



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5059	485	452	62	1974	139	23	7

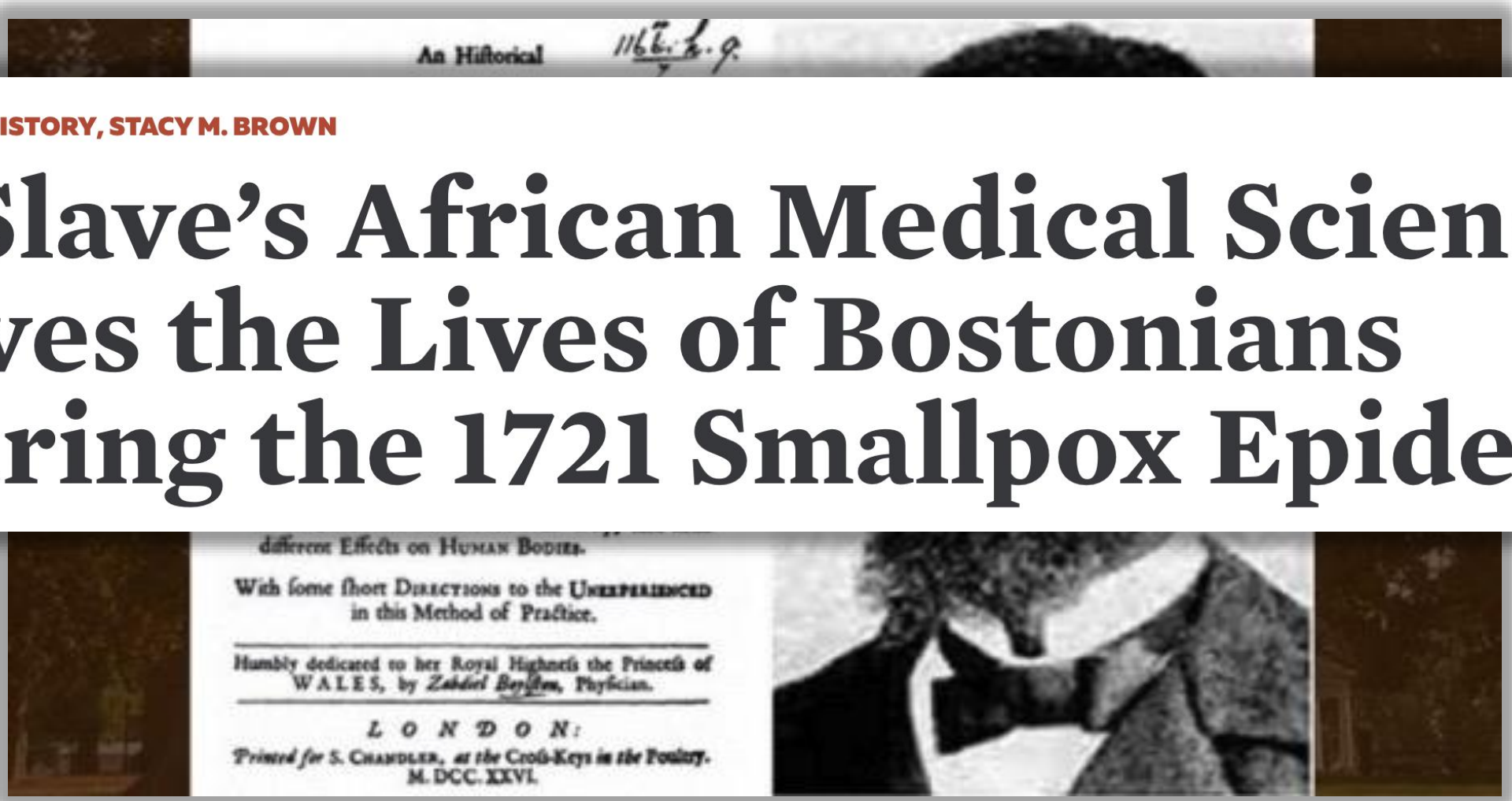
Figure 3. Table from Franklin, 1759[8] Public domain.

Figure 1. Deaths per 1000 cases, smallpox epidemics in Boston, MA, in 1721, 1730, 1752, and 1764. Data from Blake, 1953.[7]

Smallpox

BLACK HISTORY, STACY M. BROWN

A Slave's African Medical Science Saves the Lives of Bostonians During the 1721 Smallpox Epidemic

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Steam Drill in Culebra Cut
Depth of holes 18' - Jan. 17, 1905.

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By Patrick Feng

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Racial Health Disparities Didn't Start With Covid: The Overlooked History of Polio | Retro Report
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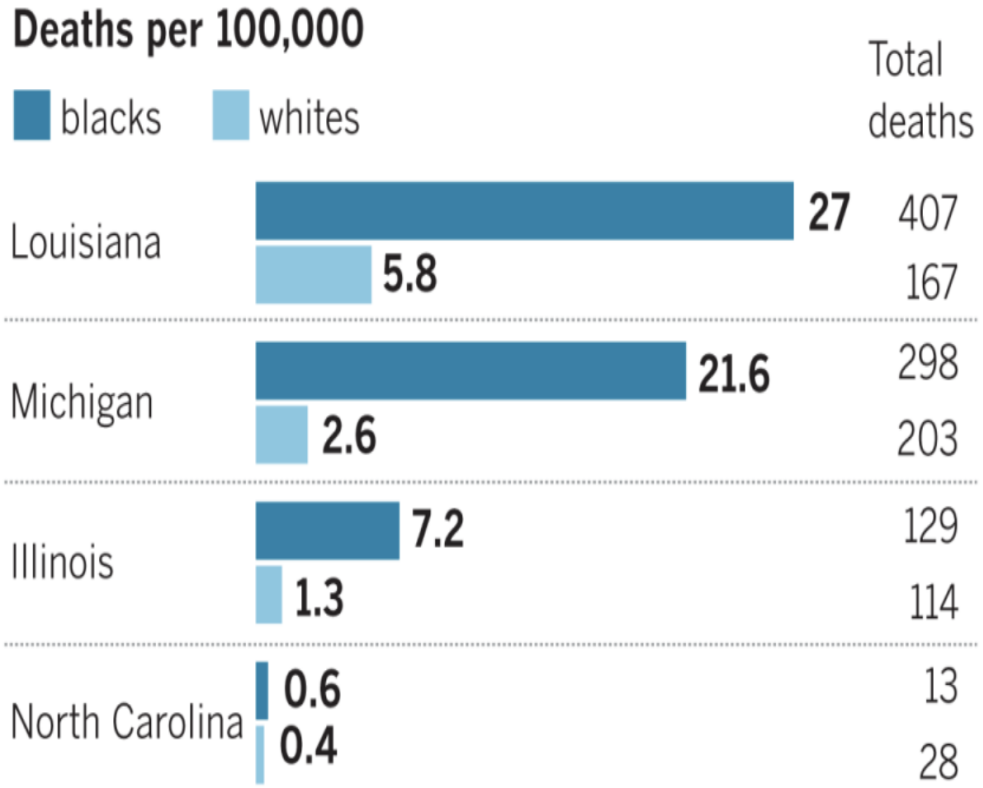
Coronavirus deaths and race

COVID-19 is disproportionately killing black Americans, according to data released by several states.

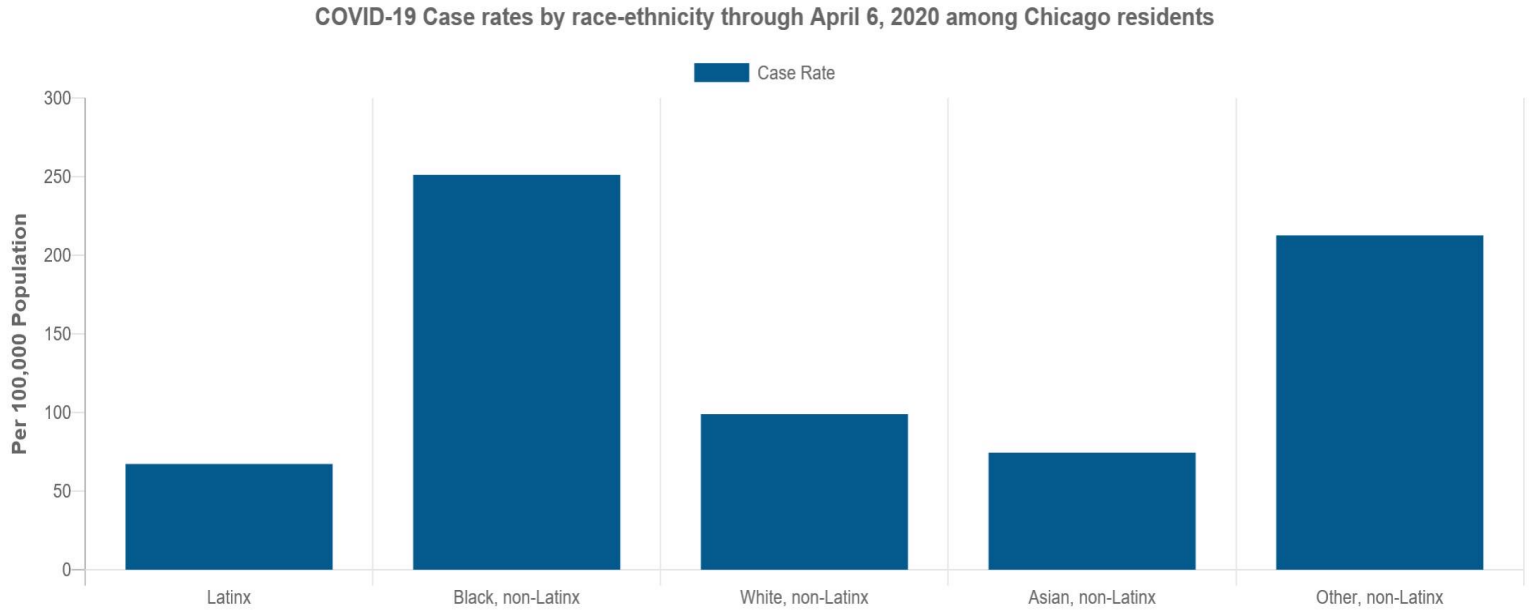


Death totals as of Tuesday afternoon.

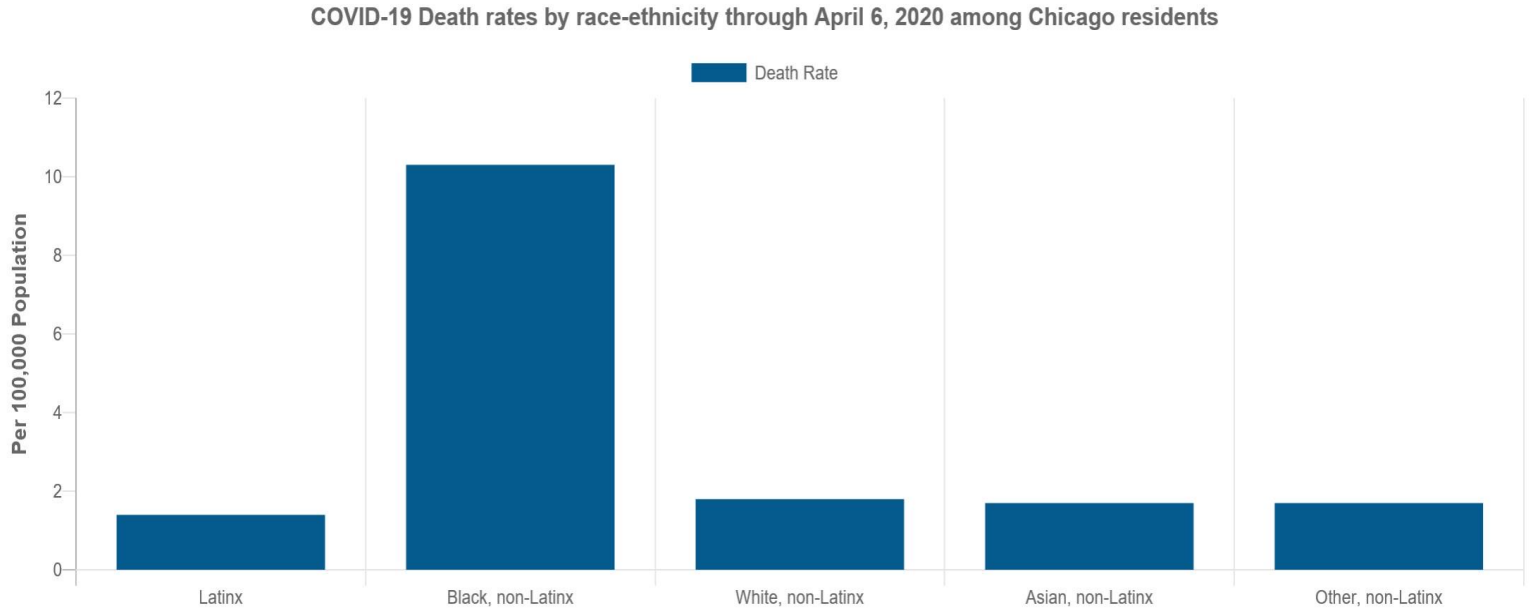
State governments, U.S. Census Bureau

Lorena Elebee / Los Angeles Times

6 days ago



Data Source: Providers reporting to CDPH through the Illinois' National Electronic Disease Surveillance System (I-NEDSS)



Data Source: Providers reporting to CDPH through the Illinois' National Electronic Disease Surveillance System (I-NEDSS)

Special Article

Hospitalization and Mortality among Black Patients and White Patients with Covid-19

Eboni G. Price-Haywood, M.D., M.P.H., Jeffrey Burton, Ph.D., Daniel Fort, Ph.D., and Leonardo Seoane, M.D.

N Engl J Med
Volume 382(26):2534-2543
June 25, 2020

The NEW ENGLAND JOURNAL of MEDICINE

Conclusions

- In a large cohort in Louisiana, 76.9% of the patients who were hospitalized with Covid-19 and 70.6% of those who died were black, whereas blacks comprise only 31% of the Ochsner Health population.
- Black race was not associated with higher in-hospital mortality than white race, after adjustment for differences in sociodemographic and clinical characteristics on admission.

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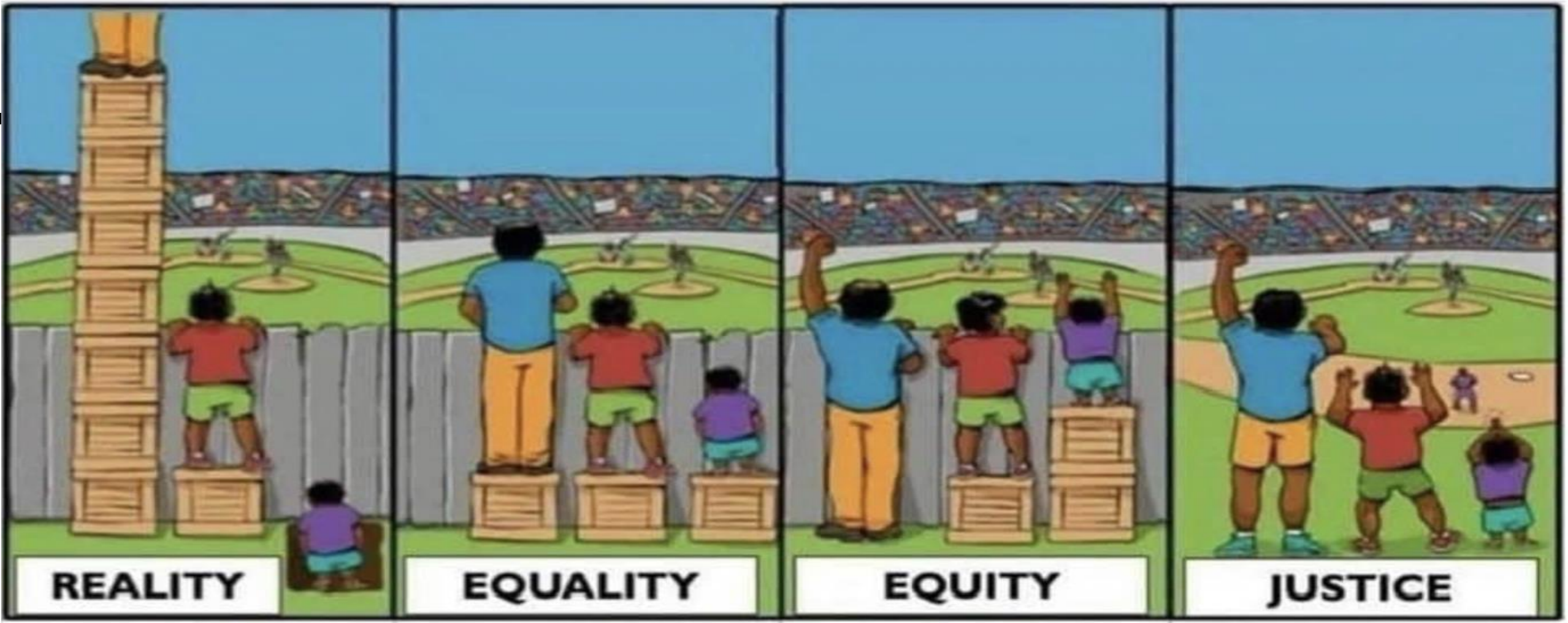

REALITY	EQUALITY	EQUITY	JUSTICE
One gets more than is needed, while the other gets less than is needed. Thus, a huge disparity is created.	The assumption is that everyone benefits from the same supports. This is considered to be equal treatment.	Everyone gets the support they need, which produces equity.	All 3 can see the game without supports or accommodations because the cause(s) of the inequity was addressed. The systemic barrier has been removed.

Nutrition and Diet

Recommendations for Nutrition and Diet		
COR	**LOE**	**Recommendations**
I	B-R	1. A diet emphasizing intake of vegetables, fruits, legumes, nuts, whole grains, and fish is recommended to decrease ASCVD risk factors.
IIa	B-NR	2. Replacement of saturated fat with dietary monounsaturated and polyunsaturated fats can be beneficial to reduce ASCVD risk.
IIa	B-NR	3. A diet containing reduced amounts of cholesterol and sodium can be beneficial to decrease ASCVD risk.

Nutrition and Diet (cont'd)

Recommendations for Nutrition and Diet		
COR	**LOE**	**Recommendations**
IIa	B-NR	4. As a part of a healthy diet, it is reasonable to minimize the intake of processed meats, refined carbohydrates, and sweetened beverages to reduce ASCVD risk.
III-Harm	B-NR	5. As a part of a healthy diet, the intake of *trans* fats should be avoided to reduce ASCVD risk.

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Vegetarian diets and cardiovascular risk factors in black

Compared with non-vegetarians, the vegetarian/vegans:

- Hypertension: 56%
- Diabetes mellitus: 48%
- Hyperlipidemia: 42%
- Elevated LDL-cholesterol: 54%

Results for pesco-vegetarians did not differ significantly from those of non-vegetarians for other variables.

Design: A cross-sectional analysis of a sub-set of 592 black women and men enrolled in the Adventist Health Study-2 (AHS-2) cohort of Seventh-day Adventists. *Setting:* Members of the AHS-2 cohort, who lived in all states of the USA and provinces of Canada.

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DOI: 10.1002/clc.22863

Results: Significant reductions were observed for serum Lp(a) (-32.0 ± 52.3 nmol/L, P = 0.003), apolipoprotein B (-13.2 ± 18.3 mg/dL, P < 0.0005), low-density lipoprotein (LDL) particles (-304.8 ± 363.0 nmol/L, P < 0.0005) and small-dense LDL cholesterol (-10.0 ± 9.2 mg/dL, P < 0.0005). Additionally, serum interleukin-6 (IL-6), total white blood cells, lipoprotein-associated phospholipase A2 (Lp-PLA2), high-sensitivity c-reactive protein (hs-CRP), and fibrinogen were significantly reduced (P ≤ 0.004).

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method in accordance with a food-classification system. Participants consumed raw fruits, vegetables, seeds, and avocado. All animal products were excluded from the diet. Participant

Received: 1 June 2018 | Revised: 7 July 2018 | Accepted: 12 July 2018

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WILEY CLINICAL CARDIOLOGY

CLINICAL INVESTIGATIONS

Consumption of a defined, plant-based diet reduces lipoprotein(a), inflammation, and other atherogenic lipoproteins and particles within 4 weeks

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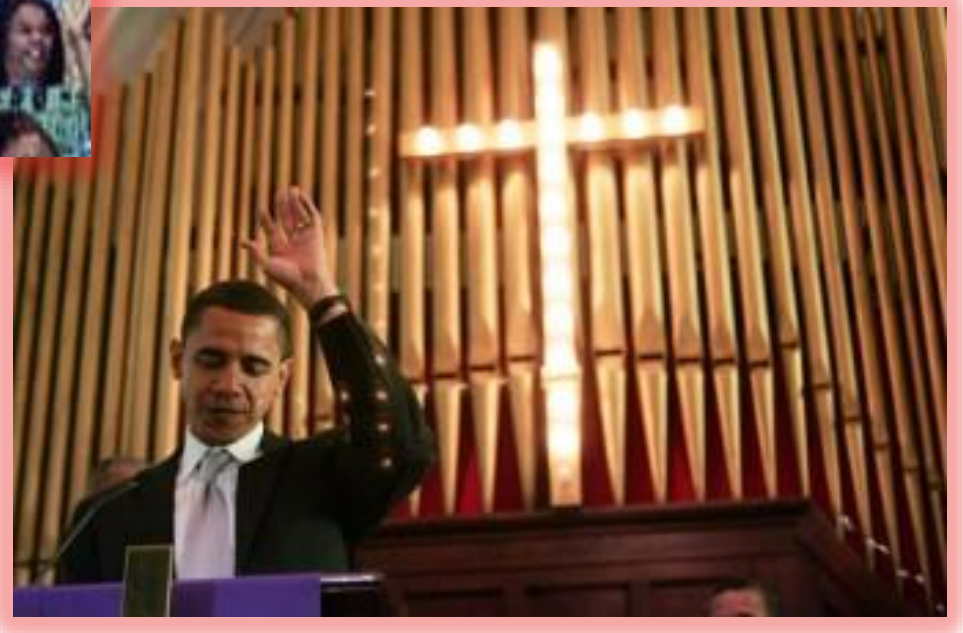
Background: Lipoprotein(a) [Lp(a)] is a highly atherogenic lipoprotein and is minimally effected by lifestyle changes. While some drugs can reduce Lp(a), diet has not consistently shown definitive reduction of this biomarker. The effect of consuming a plant-based diet on serum Lp(a) concentrations have not been previously evaluated.

Hypothesis: Consumption of a defined, plant-based for 4 weeks reduces Lp(a).

Methods: Secondary analysis of a previous trial was conducted, in which overweight and obese individuals (n = 31) with low-density lipoprotein cholesterol concentrations >100 mg/dL consumed a defined, plant-based diet for 4 weeks. Baseline and 4-week labs were collected. Data were analyzed using a paired samples t-test.

Results: Significant reductions were observed for systolic (-16.6 mmHg) and diastolic (-9.1 mmHg) blood pressure ($P < 0.0005$), serum lipids ($P \leq 0.008$), and total medication usage ($P < 0.0005$). Other CVD risk factors, including weight ($P < 0.0005$), waist circumference ($P < 0.0005$), heart rate ($P = 0.018$), insulin ($P < 0.0005$), glycated hemoglobin ($P = 0.002$), and high-sensitivity C-reactive protein ($P = 0.001$) were also reduced.

At-Risk Nutrition Intervention



nutrients

MDPI

Article

Nutrition Intervention for Reduction of Cardiovascular Risk in African Americans Using the 2019 American College of Cardiology/American Heart Association Primary Pre

Kim A
Hena

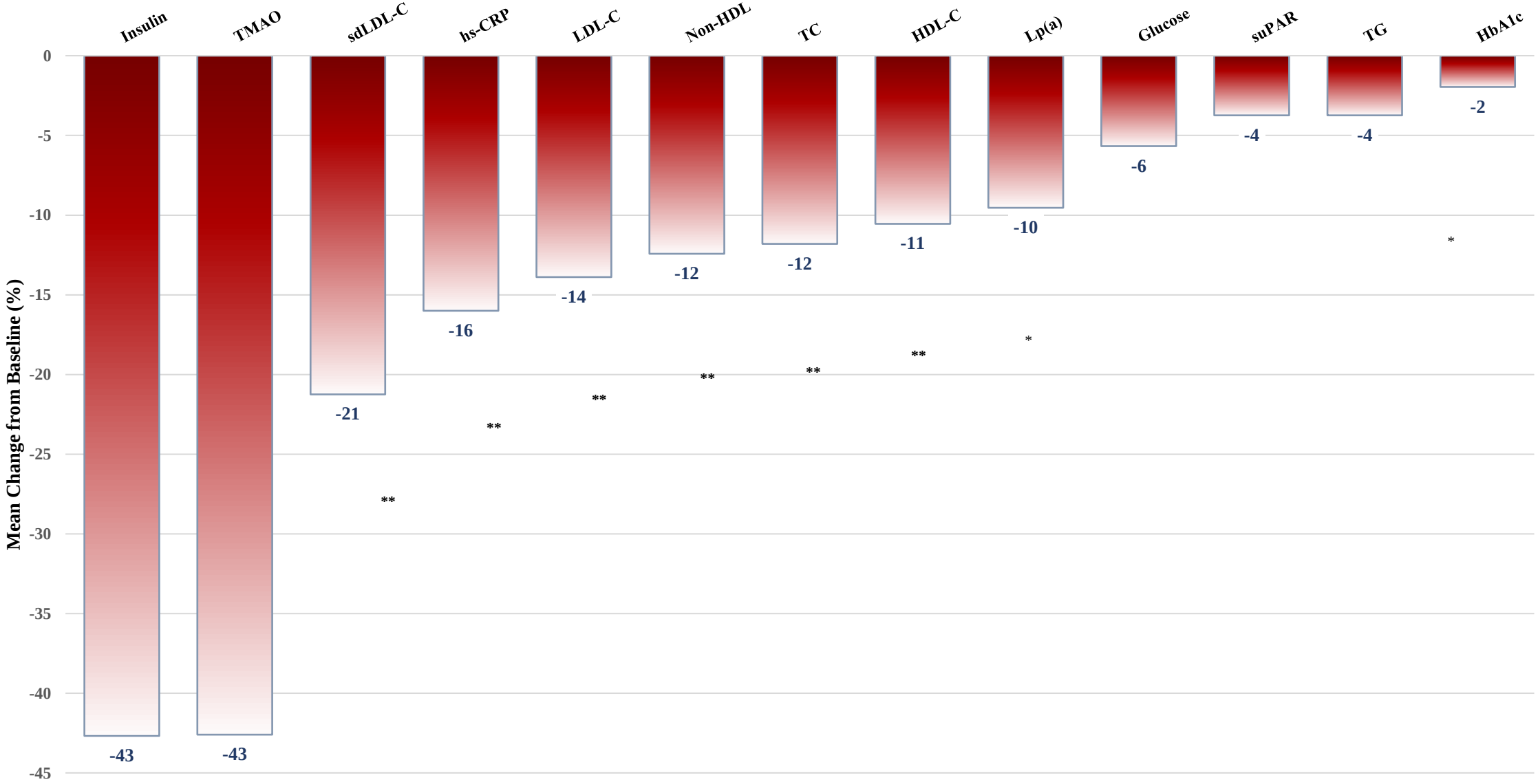
"... In this prospective *5-week non-dairy vegetarian nutrition intervention* with good adherence consistent with the 2019 ACC/AHA Guidelines in an at-risk AA population, *markers of cardiovascular risk, cardiometabolism, and body weight were significantly reduced, including obesity, low-density lipoprotein cholesterol (LDLc) density, LP(a), inflammation, and ingestion of substrates mediating production of trimethylamine-N-oxide (TMAO)*... This induced a significant decrease in the 10-year ASCVD risk in this AA cohort. If widely adopted, this could dramatically reduce and possibly eradicate, the racial disparity in ASCVD events and mortality, if *19% of the 21% increase is eliminated by this lifestyle change*...."

Citation
Fugar, S
Sawyer,
McDani

Nutrition Intervention for Reduction

Risk Today Lenten Nutrition Study). Methods: The study population consisted of 53 volunteers

Risk Factor Lowering with Plant-Based Nutrition Intervention



AMERICAN COLLEGE of CARDIOLOGY

American Heart Association.

H.E.A.R.T. LENS

- A 5-week non-dairy vegetarian intervention (ACC/AHA Guidelines) in an at-risk AA population
- Completion was high (44/53, 88%), adherence was excellent (93%)
- Markers of cardiometabolic risk and body weight were significantly reduced (440 pounds)

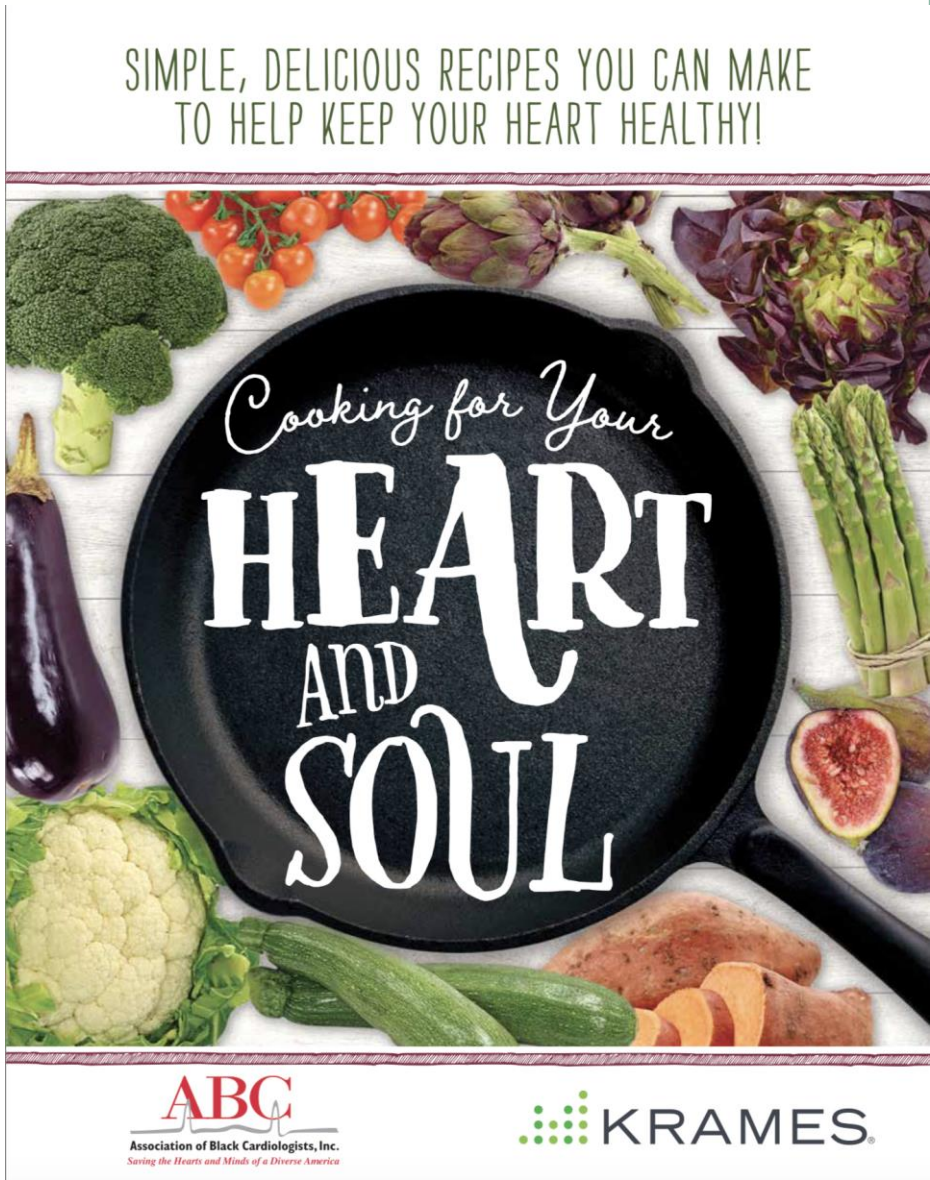
H.E.A.R.T. LENS

RUSH

Mediators and markers of CVD risk were improved:

- *lipid fractions, LDL density, LPa, inflammation, and TMAO*
- *hs-CRP and suPAR, were not lowered consistently*

Significant decrease in the 10-year ASCVD risk in this AA cohort, eliminating ***19% of the 21%*** increase in AA adults



Physician Dietary Patterns at Rush and Loyola University

200

196

14

Semivu

Lacto-ovo-v

Pesco-pollo-la

Pesco-v

Pla

Diet

UNIVERSITY OF LOUISVILLE

The Best Method for Prevention

Heart disease, kidney disease and stroke mortality are increasing, driven by diet, exercise and lifestyle choices, mediated by a risk conferred by the microbiome. Poor nutrition promotes health inequities, ethnic disparities and exorbitant healthcare costs.

Whole food plant-based diets reduce all risk CV factors, including LDLc, hs-CRP and TMAO, as well as lowering obesity, hypertension, hyperlipidemia and diabetes, and increasing quality of life and longer life-expectancy, as well as less *peripheral artery disease, coronary disease, myocardial infarction, erectile dysfunction, heart failure, chronic kidney disease, stroke and death, much of which is mediated by the microbiome.*

Prevention in cardiology mandates risk factor reduction, whenever and wherever possible by improving our microbiome to reduce mortality associated with nutrition-related illnesses.