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KAISER PERMANENTE

Scientific Approach to Nutrition 2021

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> By choosing healthy over skinny, you are choosing self-love over self-judgement.

STEVE MARABOLI

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8 in 10 Americans think advice about what to eat is **conflicting**

paleo
low-carb
vegetarian
GI
low-fat
alkaline
elimination
Nutrisystem
Zone
Volumetrics
MIND
South-Beach
keto
plant-based
atkins
Mediterranean
Ornish
macrobiotic
flexitarian
raw
vegan
DASH


FOOD IS CULTURE

What is our evidence-based message?

Food & Nutrients

Green light

EAT OFTEN

Yellow light

LIMIT

Red light

MINIMIZE

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Food & Nutrients

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Green light

EAT OFTEN

- Whole grains
- Fruits and Vegetables
- Legumes
- Nuts
- Seeds
- Fish

Whole Grains

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All-cause, CVD, Cancer mortality

Meta-analysis 18 cohort studies; n=1,041,692; Total deaths:

Each serving (28g/d) of whole grain associated with:

- 9% ↓ All-cause mortality
- 14% ↓ CVD mortality
- 3% ↓ Cancer Mortality

Zhang et al. Eur J Clin Nutr 2016

Fruit and Vegetables

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Blood pressure and diabetes

N=512,891, 10 locations in China; 3.2 million person-yrs. f/u
N=512,891, 7 yr. f/u; China Kadoorie Biobank study

Eating fresh fruits DAILY vs. RARELY/NEVER:

- SBP ↓ 4 mmHg
- Blood glucose ↓ 9 mg/dl
- Diabetes incidence ↓ 12 %

Du et al. N Engl J Med. 2016
Du et al. PloS Med. 2017

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Cognitive Decline

Prospective Study; n=960; f/u 4.4 years

Highest (1.3 serving/d) vs lowest (0.09 serving/d) green leafy vegetable intake:

- Difference of β = 0.05 (CI 0.02-0.07) or equivalent to an **11 year age difference**

Morris et al. Neurology. 2018

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Cancer mortality

Meta-analysis; 95 studies, n = 2,123,415

FRUITS/ VEGETABLES	CANCER MORTALITY
200 g/day (~2.5 servings)	↓ 4%
600 grams/day (~7.5 servings)	↓ 14%

Inverse association between:

- Cancer mortality &
- Green yellow vegetables
- Cruciferous vegetables

1 serving = 80 grams

Aune et al. International Journal of Epidemiology. 2017

Legumes

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Legumes and All-Cause Mortality

Meta-analysis; 17 studies

Legume intake up to ~150g/d (3/4 cup)

- 16% ↓ in all-cause mortality

Schwingshackl et al. Am J Clin Nutr. 2017

Nuts

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Nuts, CVD, all-cause mortality

Meta-analysis; 20 prospective cohort studies; n=467,389

Highest vs. lowest nut consumption:

- All cause mortality: 19% ↓
- Cardiovascular mortality: 27% ↓

Mayhew et al. British Journal of Nutrition. 2016

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Cancer

Meta-analysis; 36 observational studies; n=30,708 pts; follow-up 4.6 to 30 yrs
Meta-analysis; 15 studies; n=354,933

Highest vs. lowest nut consumption and cancer risk

- Colorectal cancer: 24% ↓
- Endometrial cancer: 42% ↓
- Pancreatic cancer: 32% ↓
- Overall cancer death 14% ↓

Wu et al. Nutrition Reviews. 2015
Grosso et al. Am J Clin Nutr. 2015

Seeds

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Flaxseed and Weight, Lipids, Sugars

Single-blinded, randomized control study; n=53 w/ T2D BMI 20.5 to 48.9; 12 wks,

	Flaxseed 10gm/d	Placebo	P-value
Weight	↓ 3.8 kg	0 kg	P < 0.05
BMI	↓ 1.5kg	↓ 0.1	P < 0.05
FBG	↓ 26.7 mg/dl	↓ 1.9mg/dl	P < 0.05
Total Cholesterol	↓ 37.3 mg/dl	↓ 10.4 mg/dl	P < 0.05
LDL	↓ 21 mg/dl	↓ 4.3mg/dl	P < 0.05
HbA1c	↓ 0.8%	↑ 1.0%	P < 0.05

Soltanian et al. Nutr Metab. 2018

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Flaxseed and HTN

Randomized, double-blind, placebo controlled trial; n=110; duration 6 mos;

Flaxseed 30 g/d vs placebo

- SBP ↓ 10mmHg
- DBP ↓ 7mmhg

Rodriguez-Leyva et al. Hypertension. 2013

Fish

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All Cause Mortality

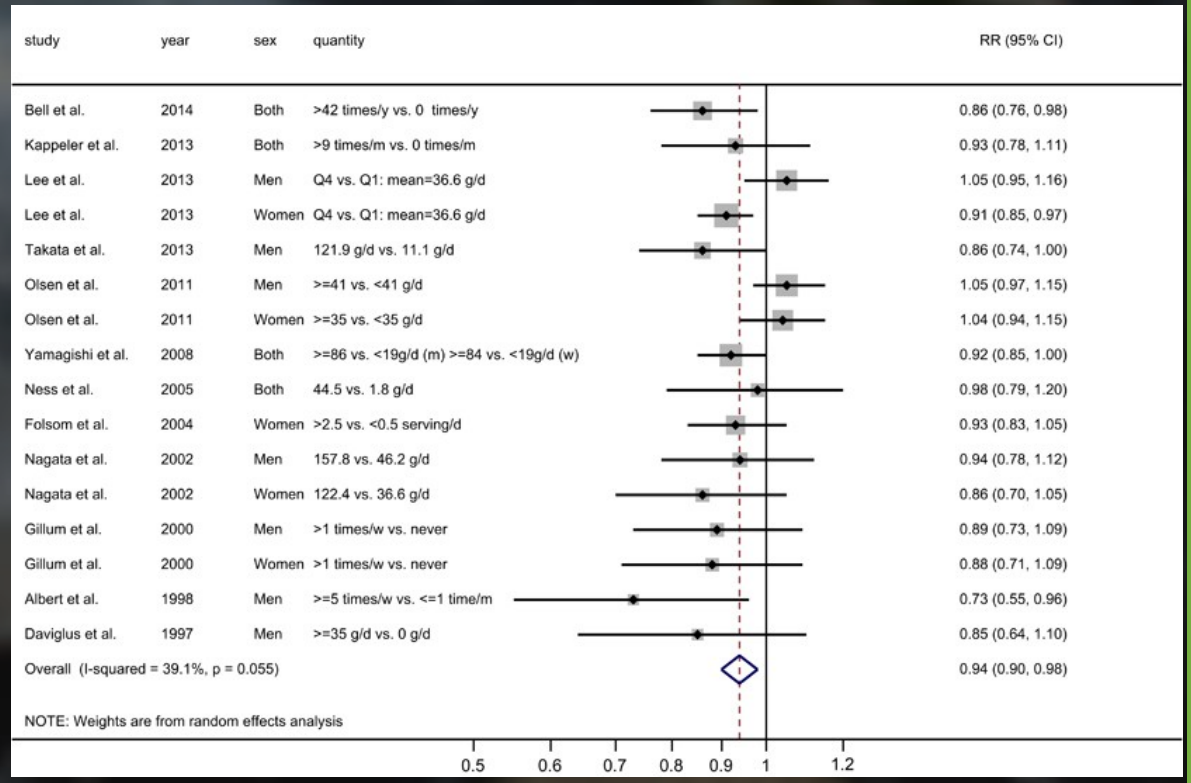
Meta-analysis; 12 prospective cohorts; n=672,389

Highest vs lowest fish consumption associated with:

- 6% ↓ All cause mortality

Fish consumption 60g/d vs none:

- 12% ↓ All cause mortality



Zhao et al. European Journal of Clinical Nutrition 70, 155-161(2016)

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Hypertension

Case controlled study; n=15,303 in China; age ≥ 15;

Highest vs. lowest fish consumption

- 30% ↓ risk of hypertension prevalence*
  - *Adjusted for smoking, activity, education, employment status, BMI and pulse*

Yu et al. American journal of Hypertension. 2018

FISH

Microplastics

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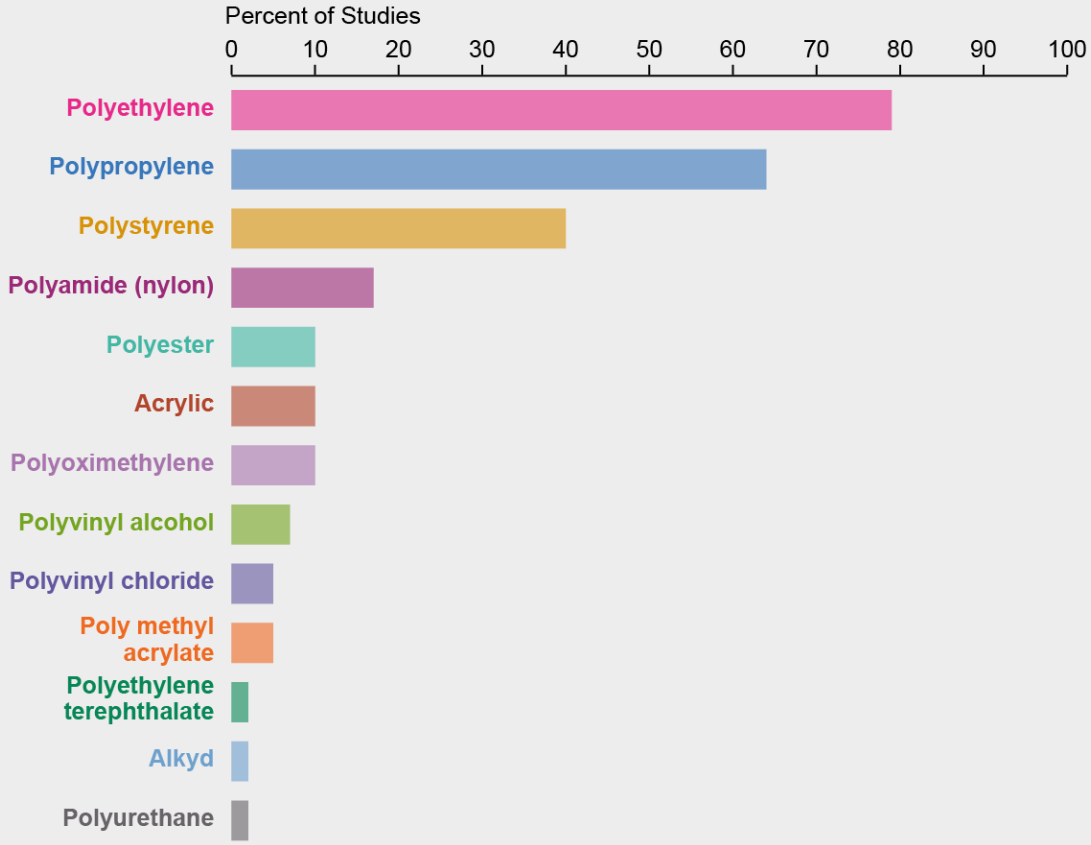
Plastics Permeate the Planet

Plastic polymers and the added chemicals that make them more durable and flexible have been used in thousands of combinations, found in everything from clothing to electronics to paint. One of the biggest categories is single-use packaging, such as plastic grocery bags and soft drink bottles. This prevalence is reflected in the polymers that show up most commonly in the microplastic debris found in the environment.

Common Polymers and Ways They Are Used

How Often Polymers Are Found in Marine Microplastic Debris



https://www.scientificamerican.com/article/from-fish-to-humans-a-microplastic-invasion-may-be-taking-a-toll/ Accessed 6/10/2020

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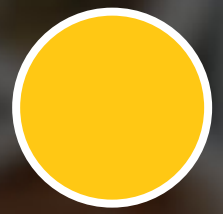
Mercury and Fish

Highest	High	Low (18 oz/wk)	Lowest (36 oz/wk)
Swordfish	Grouper	Trout	Wild/Alaskan Salmon
Shark	Chilean Sea Bass	Haddock	Shrimp
King mackerel	Bluefish	Pollock	Scallops
Gulf tilefish	Halibut	Atlantic croaker	Sardines
Marlin	Sablefish (black cod)	Crawfish	Oysters
Orange roughy	Spanish mackerel (Gulf)	Catfish	Squid
	Fresh tuna	Crab	Tilapia
		Flounder/Sole (flat fish)	
		Atlantic mackerel	
		Mullet	

Consumerreports.org. Accessed 8/2018

Food & Nutrients



Yellow light

LIMIT

- Poultry
- Dairy
- Oils
- Eggs
- Alcohol

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Poultry

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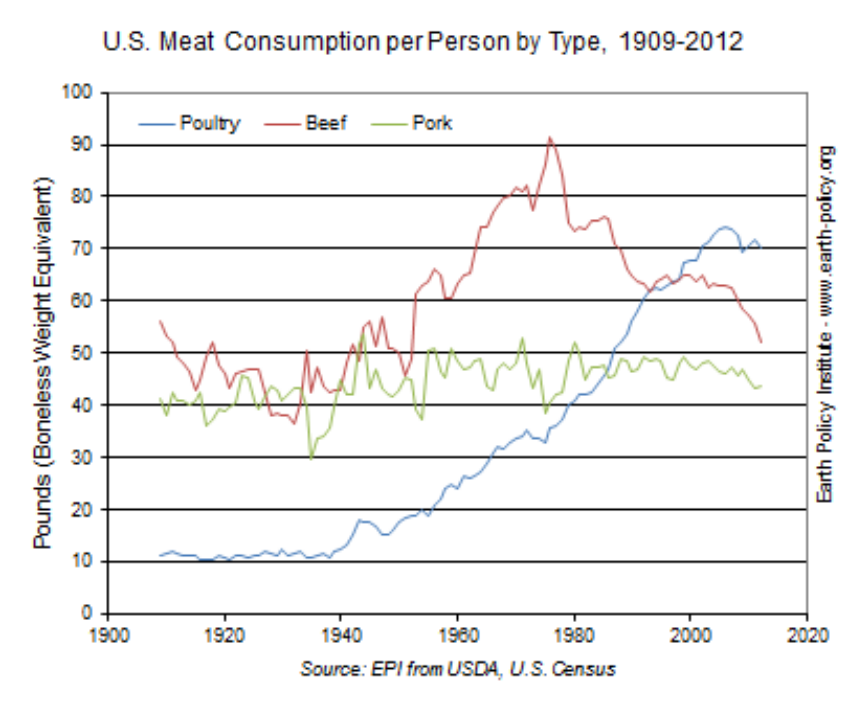
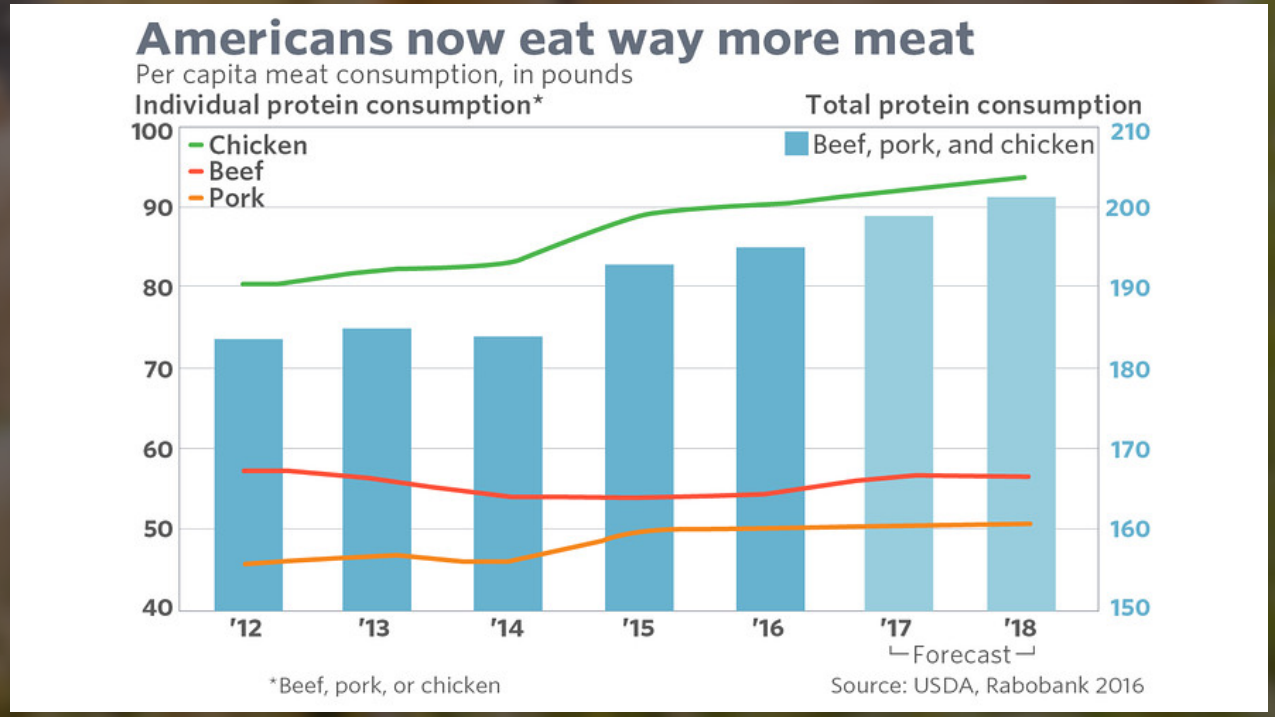
Poultry Consumption





https://www.marketwatch.com/story/this-chart-proves-americans-love-their-meat-2016-08-15; Accessed 10/24/19
https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=93225; Accesed 10/24/19

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Positive

Meta-analysis, 7 studies; n=354,718
Meta-analysis, 14 prospective studies; n=2,378,204
Meta-analysis, 48 studies; US, Europe, Asia, Australia; n=1.5 million participants

Highest vs lowest poultry consumption

- No association w/ total, ischemic or hemorrhagic stroke risk
- No increase in total cancer mortality
- 14% ↓ diabetes incidence

Mohammadi et al. Clin Nutr ESPEN. 2018
Zhang et al. Nutr Cancer. 2018
Franziska et al. Jn of Nutr. 2017

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Negative

Prospective cohort study; n=138,266; dietary assessment 1982, 1992
Meta-analysis; 10 prospective cohort studies; n=351,819

Highest vs lowest poultry consumption

- 27% ↑ pancreatic cancer risk
- 15% ↑ risk of hypertension

McCullough, ML et al. Cancer Causes Control. 2018
Zhang et al. Journal of Human Hypertension. 2018

Dairy

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Positive

ARIC Study; n=11,952, age 44-66; median f/u: 23 yrs; eGFR > 60ml/min/1.73m^2

EPIC-Italy; n=45,009; f/u=14.9 yrs

Highest vs. lowest dairy intake

- 25% ↓ risk of CKD (*only low-fat dairy*)
- No link with all-cause mortality

Haring et al. Journal of Renal Nutrition 2017
Pala et al. Am J Clin Nutr 2019

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Negative

Nurses Health Study (n=80,736), 26 yr. f/u; Health Professionals Study (n=48,610), 24 yr. f/u); meta-analysis of 4 previous studies

Meta-analysis; 11 studies; n=778,929

≥ 3 servings/day low-fat dairy vs < 1

- 39% ↑ risk for Parkinson's disease

Highest vs. lowest whole milk intake in men

- 43% ↑ prostate cancer mortality

Hughes et al. Neurology. 2017
Lu et al. Nutritional Journal. 2016

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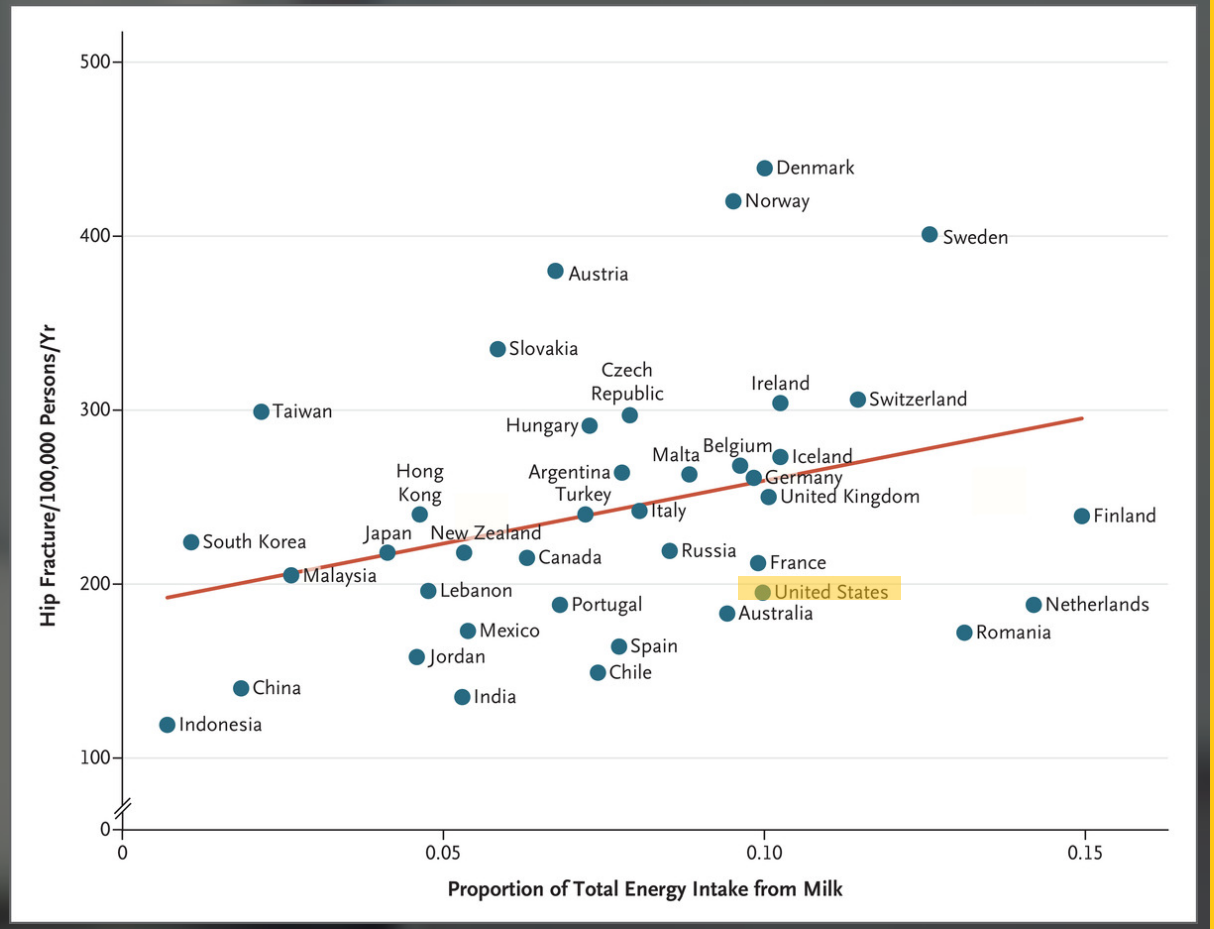
Negative

Comparing countries with highest milk and calcium intake and hip fractures



Hegsted. J Nutr 1986;116:2316-2319.
Hegsted. Am J clin Nutr 2001;74:571-573.
WC Willett, DS Ludwig. N Engl J Med 2020;382:644-654

The NEW ENGLAND JOURNAL of MEDICINE

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N-glycolylneuraminic acid (Neu5Gc)

Silica acid found in bovine (cows, goats, sheep, bison, buffalo) milk and mammals (lamb, pork, beef).

Negligible concentration in fish and chicken

Neu5Gc treated by human immune system as foreign and **creates inflammatory response**.

Limited data from epidemiological studies

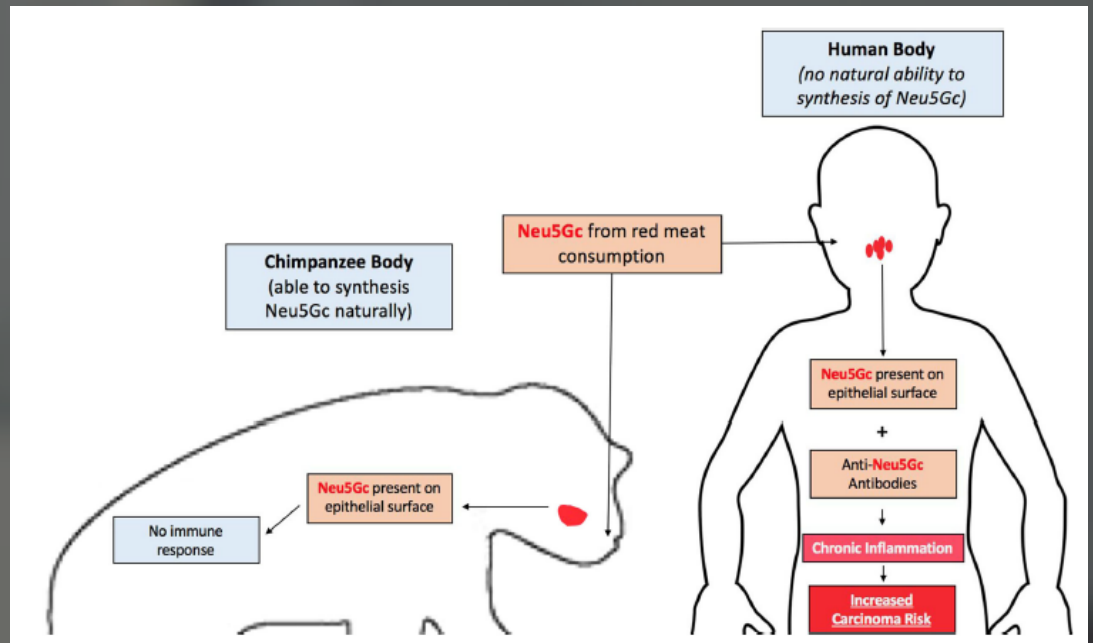

Fig. 4 Comparison of the effect of Neu5Gc consumption in chimpanzees with humans. The consumption of Neu5Gc results in the human immune system producing anti-Neu5Gc antibodies, which leads to chronic inflammation while no immune system response is observed in chimpanzees

Ijssennagger et al. PLoS One. 2012:7:e43260

Oils

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Olive Oil and CAD

Meta-analysis; 32 cohort studies; n=841,211

Higher MUFA intake:

- 11% ↓ All-cause mortality
- 12% ↓ CV mortality
- 17% ↓ Stroke

Schwingshackl et al. Lipids in Health and Disease. 2014

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Coconut oil and CVD

Review 21 studies (8 clinical; 13 observational)

Coconut oil ↑ total and LDL greater than unsaturated plant oils

Coconut flesh or squeezed coconut does **NOT** lead to adverse cardiovascular outcomes

Eyres et al. Nutrition Reviews. 2016
Prior et al. Am J Clin Nutr. 1997
Lindeberg et al. J Intern Med. 1993

Eggs

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Eggs and All-cause Mortality

6 Cohort study follow-up (ARIC, CARDIA, FHS, FOS, JHS, MESA); median f/u 17.5 yrs; n=29,615

Each additional 300mg dietary cholesterol (1 egg ~ 186 mg cholesterol)

- 17% ↑ risk of CVD
- 18% ↑ of all-cause mortality

Zhong et al. JAMA. 2019

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All-cause Mortality, Cancer, CVD

EPIC-Spain; prospective cohort; n=40,621; 18.4 yrs f/u

Highest vs lowest consumption

- No association for all-cause, cancer, and CVD mortality

Inverse association with ↑ egg consumption

- 41% ↓ in death from CNS diseases
  - 10% ↓ Alzheimer's and Parkinson's diseases

Zamora-Ros et al. European Journal of Nutrition. 2019

Alcohol

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Alcohol and Cognitive Decline

Prospective Cohort Study; 550 particpants; f/u 30 yrs

Highest alcohol use vs abstinence associated with:

- increased hippocampal atrophy.
- Dose dependent effect

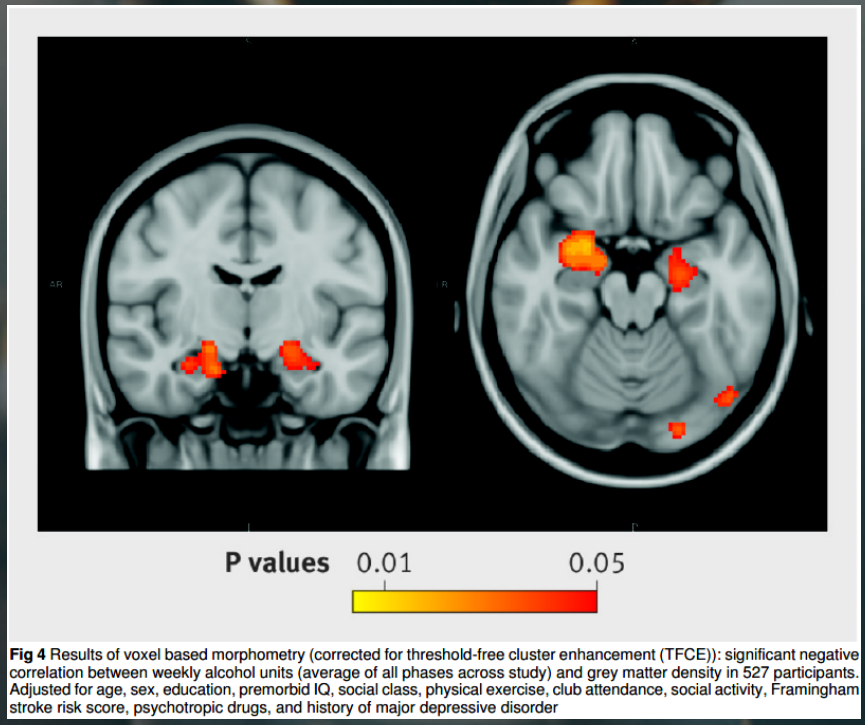

Fig 4 Results of voxel based morphometry (corrected for threshold-free cluster enhancement (TFCE)): significant negative correlation between weekly alcohol units (average of all phases across study) and grey matter density in 527 participants. Adjusted for age, sex, education, premorbid IQ, social class, physical exercise, club attendance, social activity, Framingham stroke risk score, psychotropic drugs, and history of major depressive disorder

Topiwala et al. BMJ 2017

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Alcohol and Cognitive Decline

Prospective Cohort Study; 550 particpants; f/u 30 yrs

Highest alcohol use vs abstinence:

- Faster decline in word recall memory
- NO evidence to support light drinkers protected from cognitive decline vs abstainers.

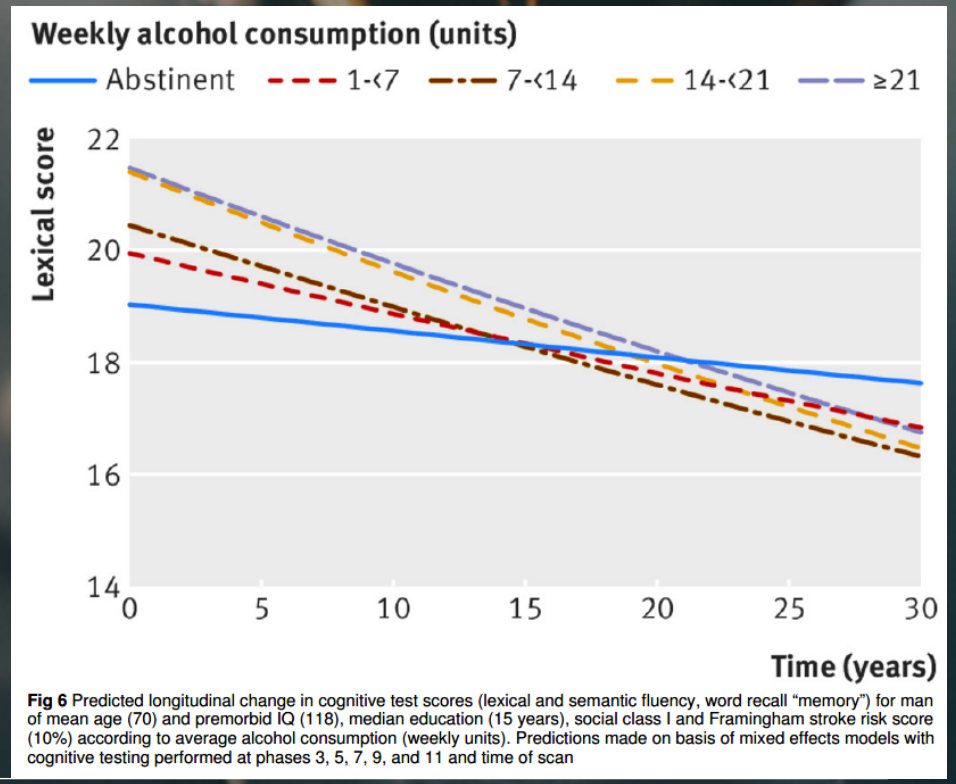

Fig 6 Predicted longitudinal change in cognitive test scores (lexical and semantic fluency, word recall "memory") for man of mean age (70) and premorbid IQ (118), median education (15 years), social class I and Framingham stroke risk score (10%) according to average alcohol consumption (weekly units). Predictions made on basis of mixed effects models with cognitive testing performed at phases 3, 5, 7, 9, and 11 and time of scan

Topiwala et al. BMJ 2017

Food & Nutrients

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Red light

MINIMIZE

- Salt
- Red and processed meats
- Sugar sweetened foods and beverages
- Artificial sweeteners
- Refined grains

Salt

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Cardiometabolic deaths

Comparative risk assessment model NHANES (1999–2002, 2009–2012)

High Na intake (>2g/d) linked to:

- 66,508 or 9.5% of deaths from heart disease, stroke, and T2DM

Micha et al. JAMA. 2017

Red and Processed Meats

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Red Meat and Mortality

Meta-analysis 12 studies

Each additional 100 g/d associated w/

- 10% ↑ risk of all-cause mortality

Schwingshackl et al. Am J Clin Nutr. 2017 Jun;105(6): 1462-1473

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RISK PER SERVING

Health Professionals f/u study (37.698 men); Nurses' Health Study (n=83,644)

	RED MEAT	PROCESSED MEAT
Total Mortality	13% ↑	20% ↑
Cancer Mortality	10% ↑	16% ↑
Cardiovascular Mortality	18% ↑	21% ↑

Pan et al. Arch Int Med. 2012

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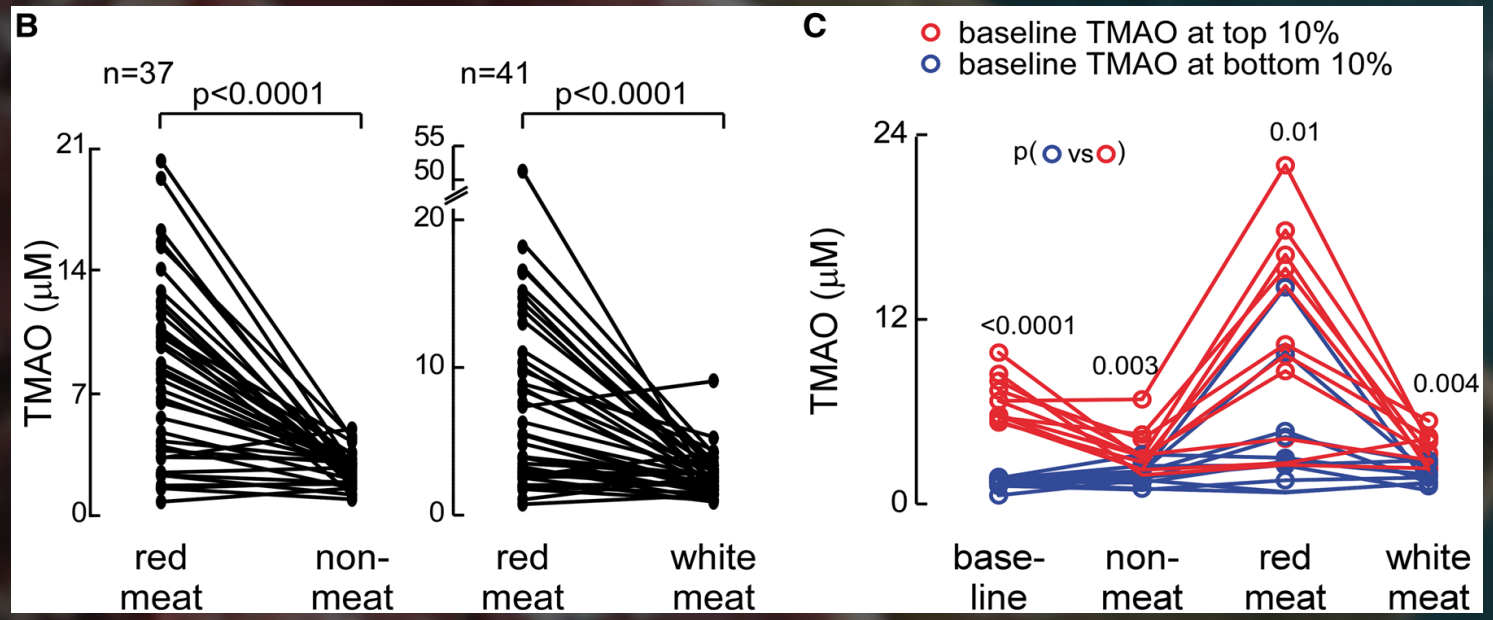
Red meat vs white meat vs non meat

Randomized, cross-over design study, n=113, median age 45; all omnivores

- 3x ↑ TMAO levels during red meat diet vs white meat or non meat
- Takes 4 wks for TMAO levels to return to baseline after stopping red meat



European Heart Journal, Volume 40, Issue 7, 14 February 2019, Pages 583–594, https://doi.org/10.1093/eurheartj/ehy799

Sugar-sweetened foods and beverages

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Cardiovascular mortality

NHANES survey 1988-2006; n=111,733

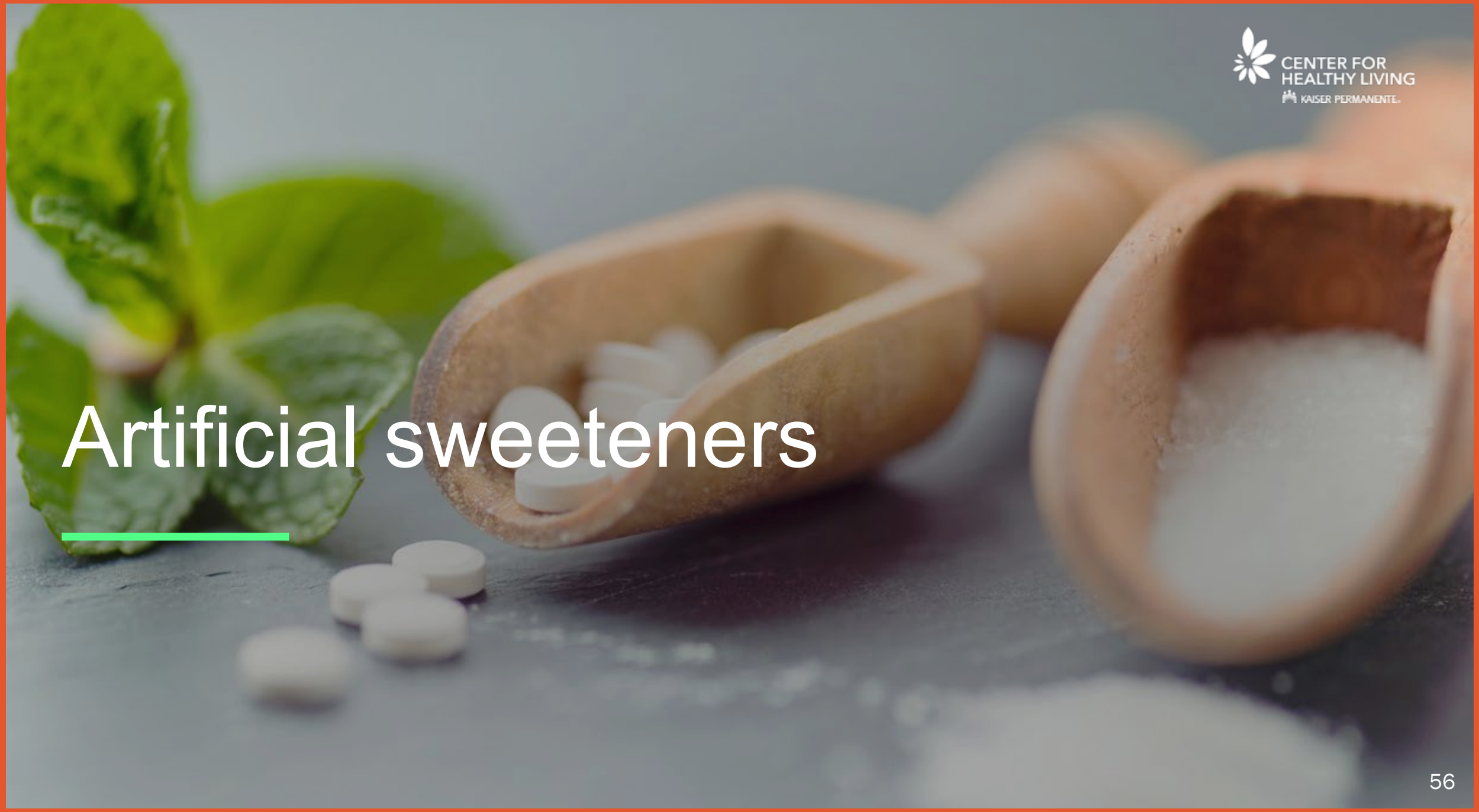
Consuming 10%-24.9% calories from added sugars vs <10%

- 30% ↑ risk

Consuming ≥25% calories from added sugars vs <10%

- 175% ↑ risk

Yang et al. JAMA Int Med. 2013



Artificial sweeteners

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Risk of Weight Gain

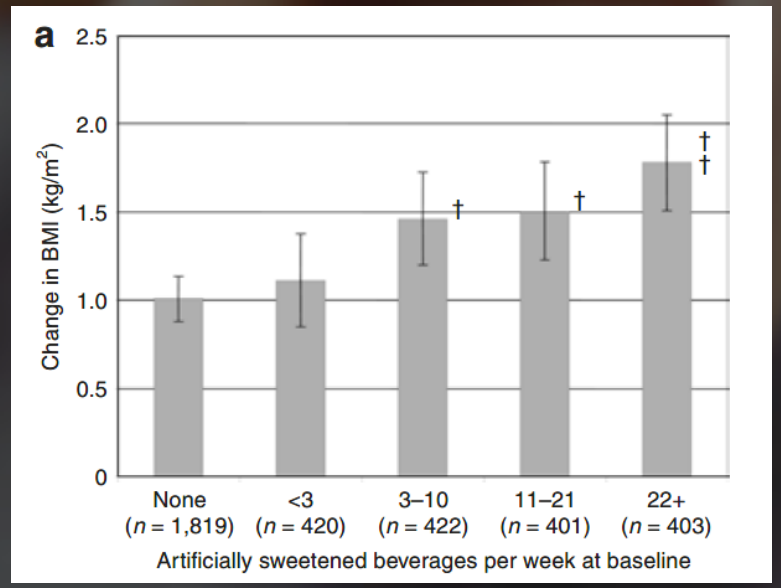
San Antonio Heart Study; 1979-1988; n=5158; 7-8 year follow-up

Overall adjusted BMI w/ Artificial Sweetener users vs nonusers

- 47% higher

Consuming > 21 Artificial Sweetened beverages/wk vs none

- 93% ↑ risk of becoming overweight or obese



Fowler et al. Obesity. 2012

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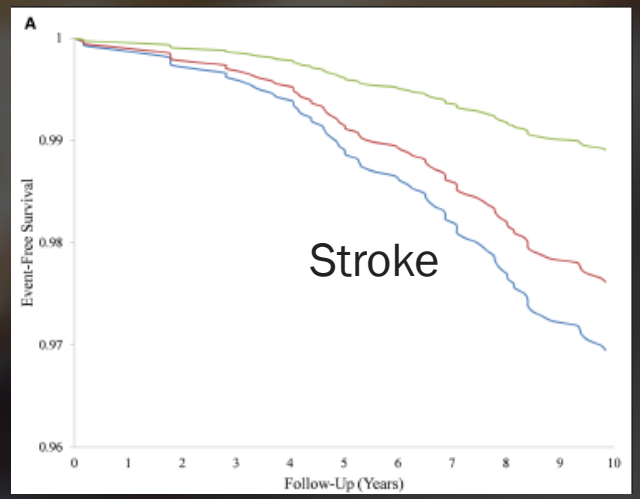
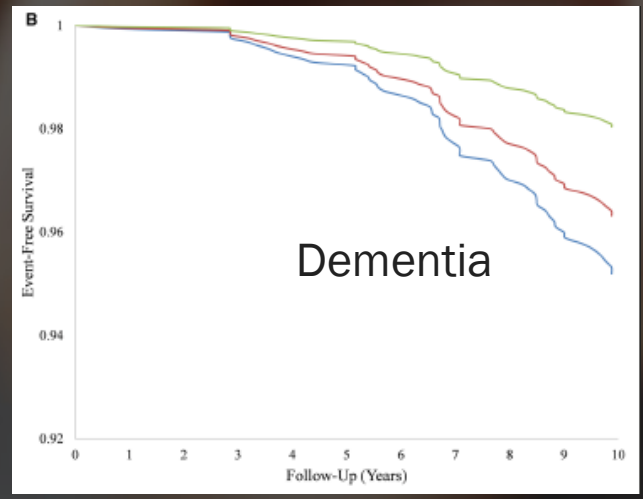
Stroke and Dementia

Framingham Heart Study Offspring Cohort; n=2888, age > 45 for stroke; n=1484, age > 60 for dementia; f/u 10 yrs

≥ 1/d artificially sweetened soft drink vs none

- 196% ↑ risk of stroke
- 147% ↑ risk of all-cause dementia





Pase et al. Stroke. 2017

Refined grains

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Refined Grains

Prospective South Korean cohort study; n=5717; f/u 10 yr (2001-2012)

Highest consumption (≥3 servings/d) vs lowest (<1 serving/d) of refined grains had:

- 63% ↑ risk of developing metabolic syndrome.

Kang et al. J. Nutr. 2019

The Bottom Line

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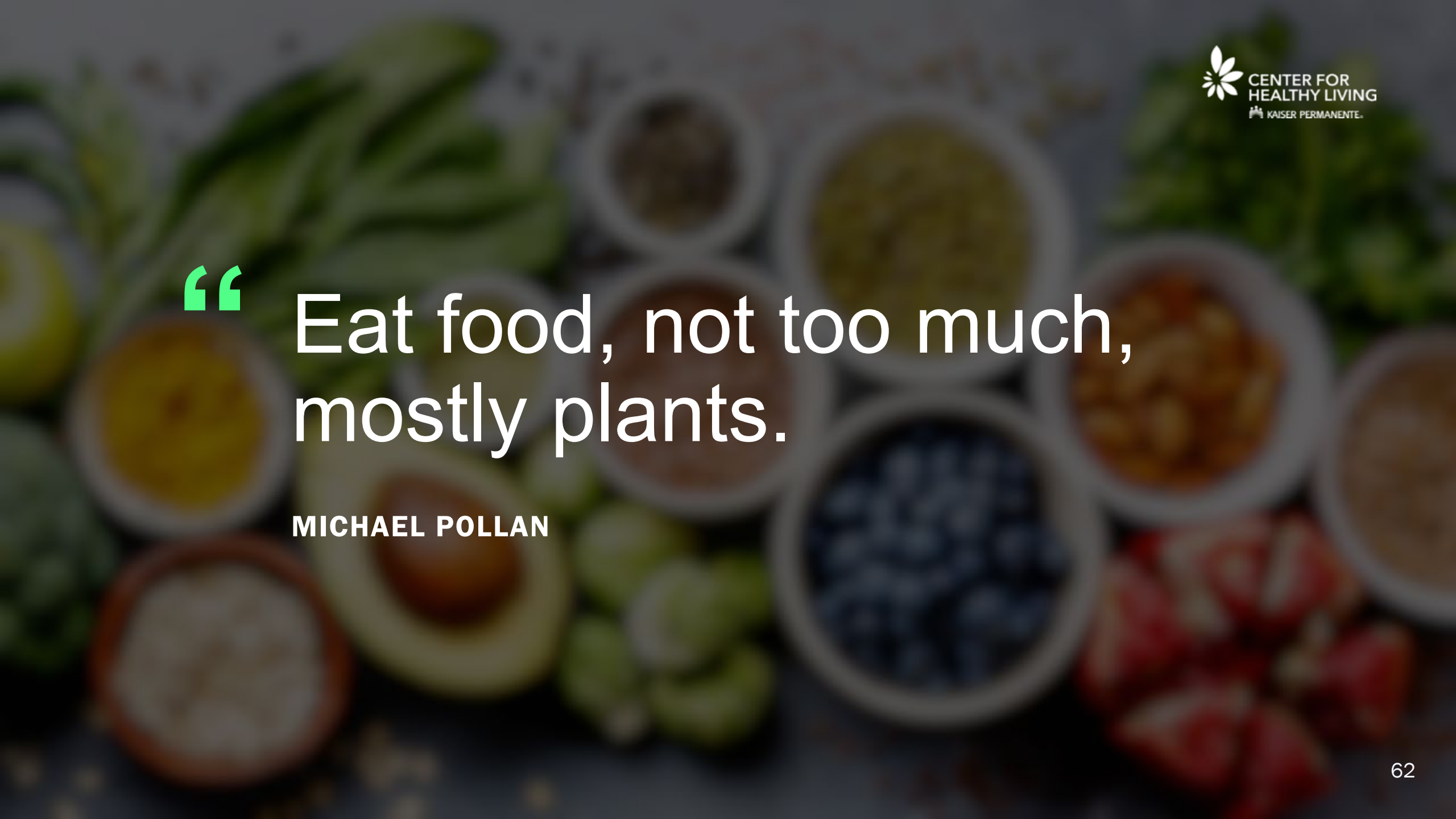

“Eat food, not too much, mostly plants.

MICHAEL POLLAN

THE BOTTOM LINE

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Eat Often

Whole grains (whole-wheat bread, whole-grain pasta, brown rice)

Fruits and vegetables

Legumes (beans, peas, lentils)

Fish

Seeds

Nuts

Limit

Eggs

Poultry

Dairy

Oils

Alcohol

Eat Rarely

Sugar-sweetened foods and drinks

Red meat (beef, pork, lamb) and **processed meat** (bacon, sausage, ham)

Refined grains (white bread, enriched pasta, white rice)

Artificial sweeteners

Salt

The Bottom Line

- Fruits and vegetables
- Whole grains
- Fish
- Legumes
- Nuts
- Seeds

- Sugar-sweetened foods and drinks
- Refined grains
- Red and processed meats
- Artificial sweeteners
- Salt

Thank you!

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