



Food Is Medicine

ASU Retirees Association – March 6, 2025

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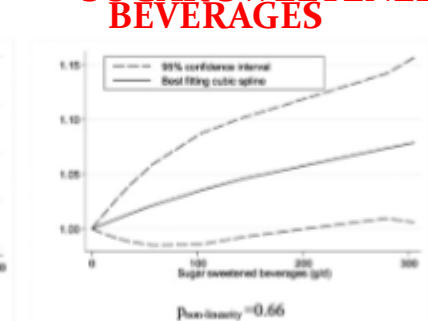
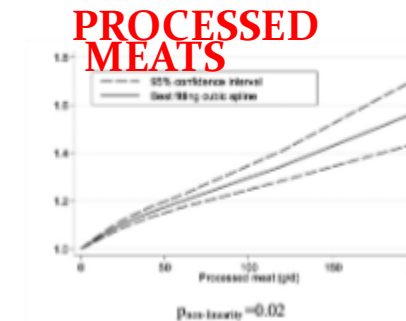
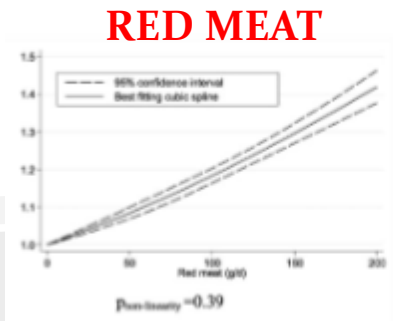
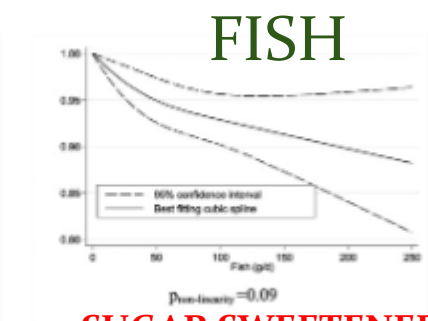
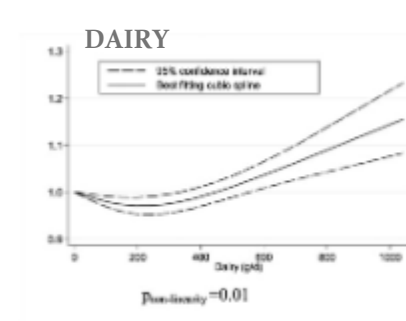
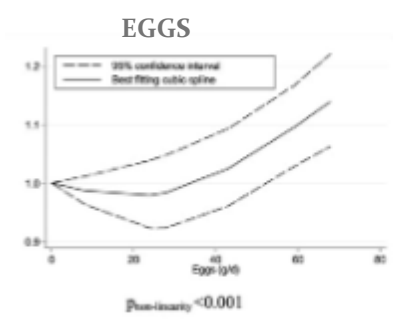
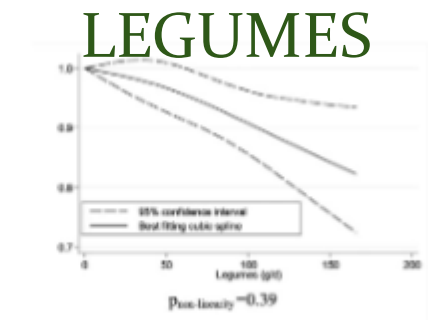
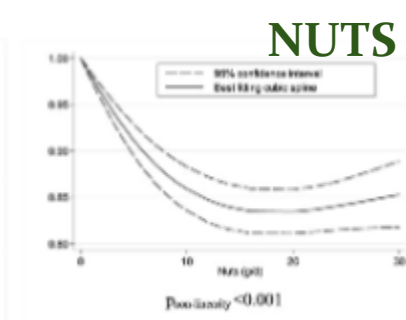
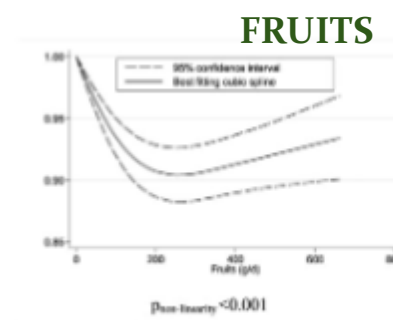
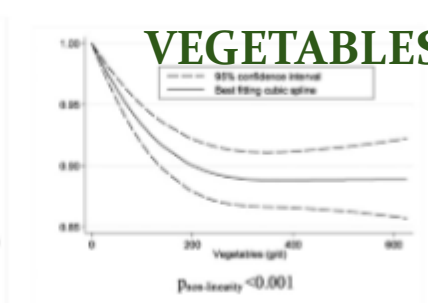
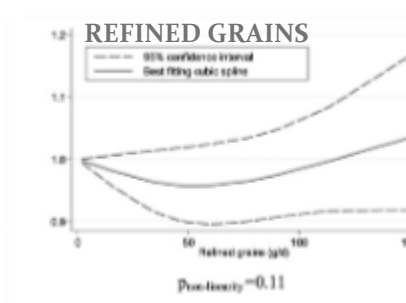
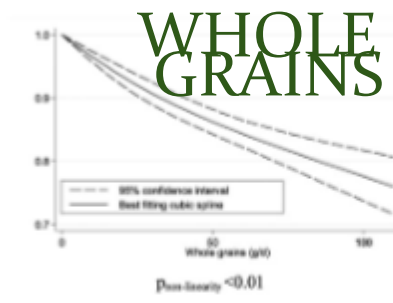
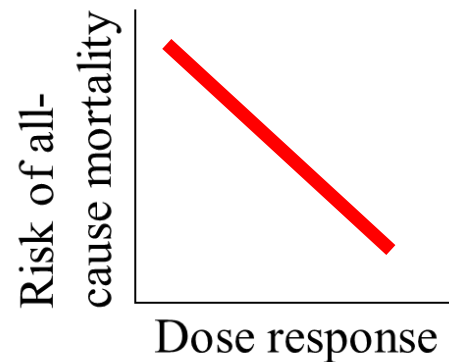



Food Is Medicine: Overview

- Foods linked to reduced risk for mortality
- Vinegar and type 2 diabetes
- Vinegar and mental health
- Vinegar and muscle health
- Nitrate-rich foods and blood pressure/heart disease risk
- Vitamin C and respiratory conditions




Foods and Mortality





Medicine (Oxford Dictionary): *a compound or preparation used for the treatment or prevention of disease, especially a drug or drugs taken by mouth*

'Let thy food be thy medicine and
medicine be thy food'
--Hippocrates (400 BC)



Adjunct Therapy: *Another treatment used together with the primary treatment. Its purpose is to assist the primary treatment*

Type 2 Diabetes:
Metformin

20,122,987

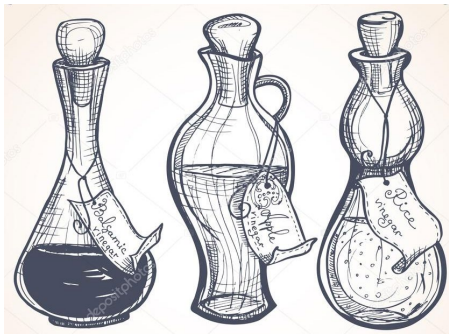
Depression:
Prozac

4,717,183

VINEGAR

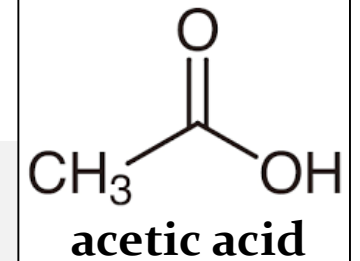
VINEGAR

- Hippocrates prescribed vinegar mixed with honey for a variety of ills, including coughs and colds
- The Old Testament (Ruth 2:14): after working hard in the fields, Ruth was invited by Boaz to eat bread and dip it in vinegar.



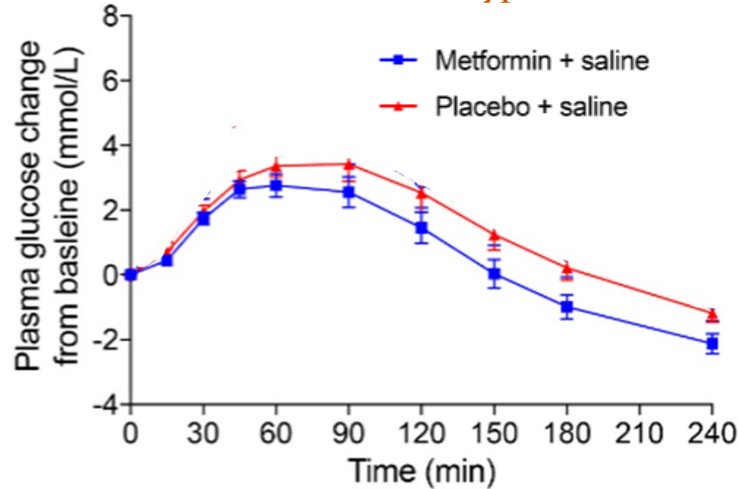
The making of vinegar (dates to 3000 BC):

- base is fruit or grain mash
- alcoholic fermentation, performed anaerobically by yeast
- acetic fermentation, performed aerobically by bacteria



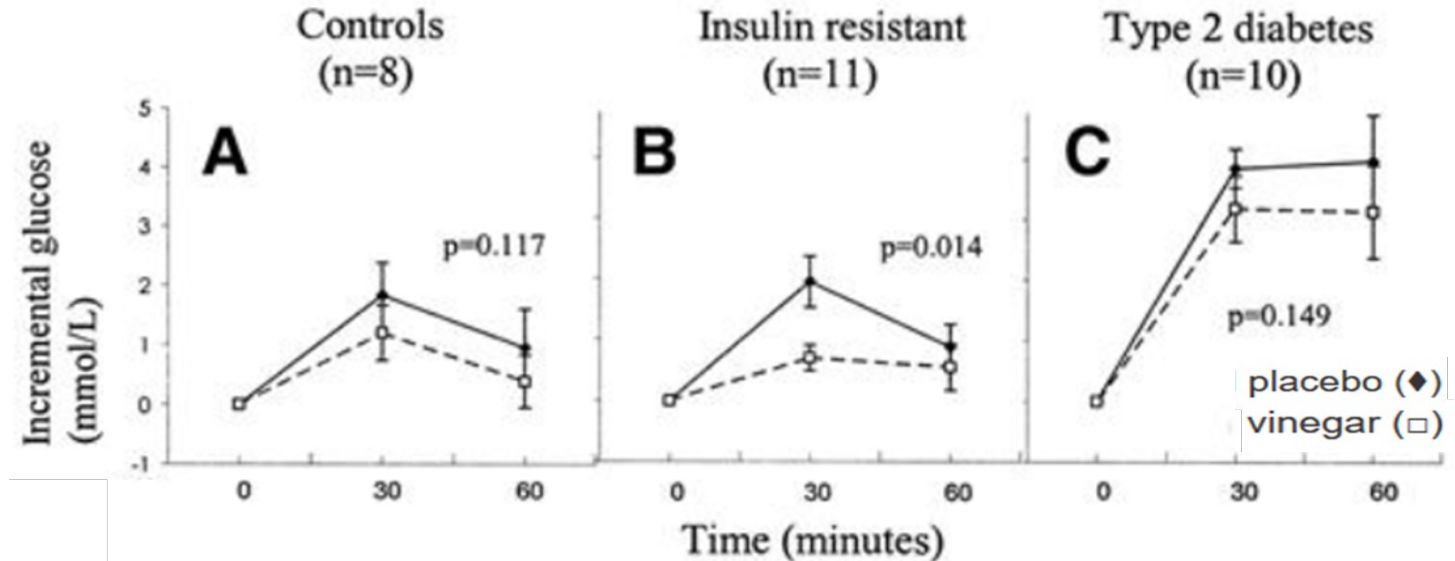
Vinegar as adjunct therapy for diabetes

Metformin: currently recommended as the first-line treatment of type 2 diabetes



Twelve patients with type 2 diabetes were included in this placebo-controlled, double-blinded study. On separate days, the patients received metformin (1,500 mg) or placebo suspended in a liquid meal

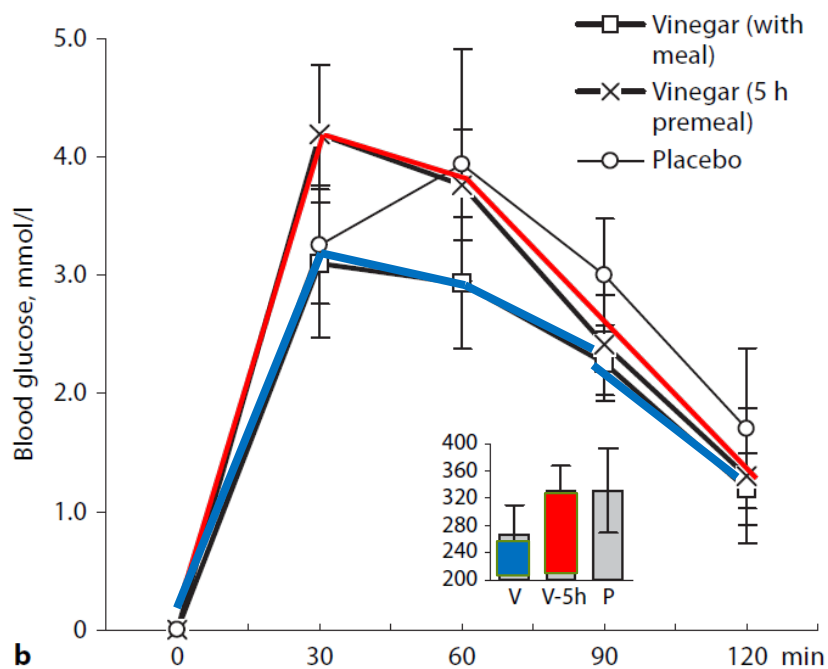
Vinegar



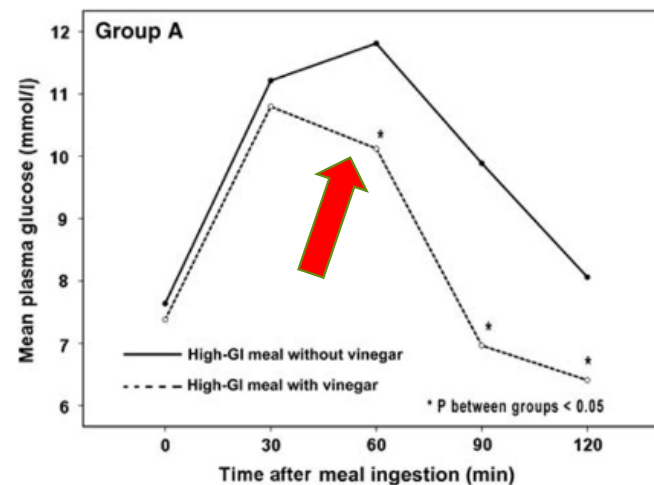
Randomized, double-blinded placebo-controlled trial in healthy individuals and individuals with prediabetes or type 2 diabetes. On separate days the participants received vinegar dosage (40 g) or placebo immediately prior to bagel/juice meal.



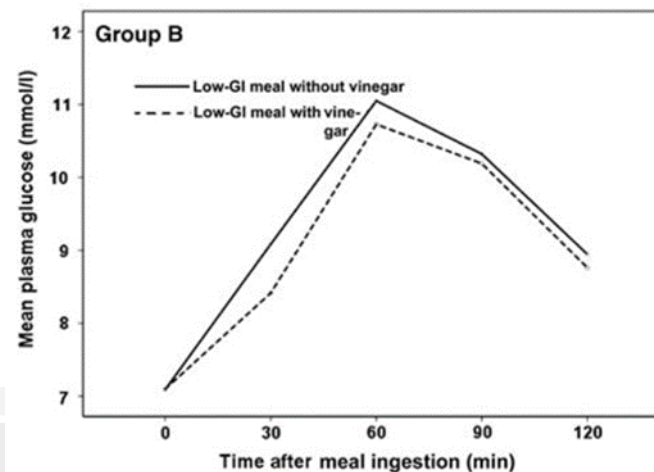
Vinegar – understanding the ‘prescription’



The vinegar is to be ingested at the start of the meal: 1-2 TBLS diluted in a cup of water



The addition of vinegar reduces postprandial glycaemia in patients with T2D only when it is added to a high-GI meal



Vinegar – think outside the box



MUSTARD

5% vinegar
1-2 TBLS



Choose any appealing
recipe and use at least a 1:1
vinegar and oil portioning

HOMEMADE VINAIGRETTE DRESSING



FERMENTED VEGETABLES: A PART OF CUISINES WORLDWIDE

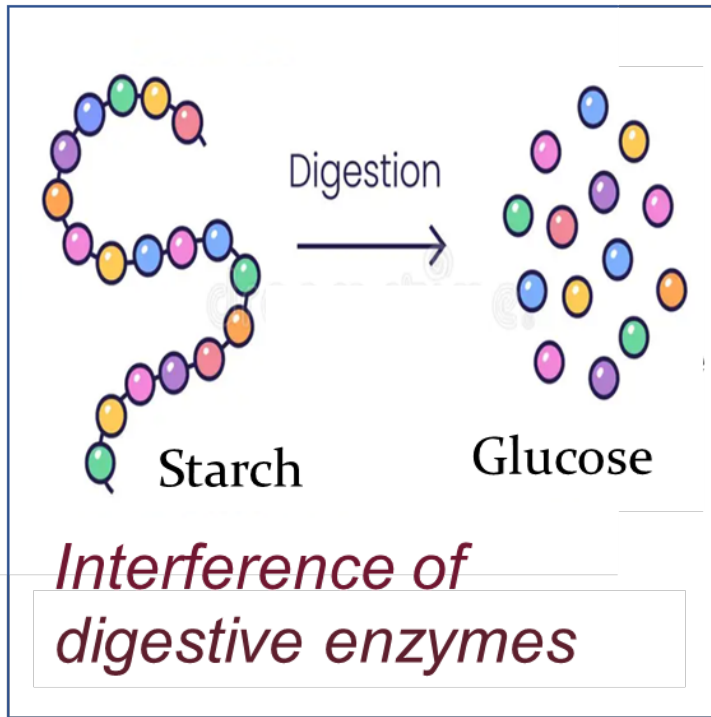
Dill pickle (U.S.A)
Pikliz. (Haitian spicy pickled vegetables)
Misozuke. (Japanese miso pickle)
Torshi. (Iranian, Afghan pickled vegetables)
Jalapeños en Escabeche. (Mexican pickled jalapeño peppers)
Baechu Kimchi. (Korean spicy fermented cabbage pickle)
Acar Ketimun. (Indonesian cucumber pickle)



VINEGAR RICE

Sushi cooked rice is
acidified to control the
growth of pathogens since
sushi rice is held at room
temperature. Hence,
vinegar-flavored rice is
used for all kinds of sushi

Vinegar – what is the mechanism?



Vinegar is the **ONLY** dietary source of acetic acid/acetate

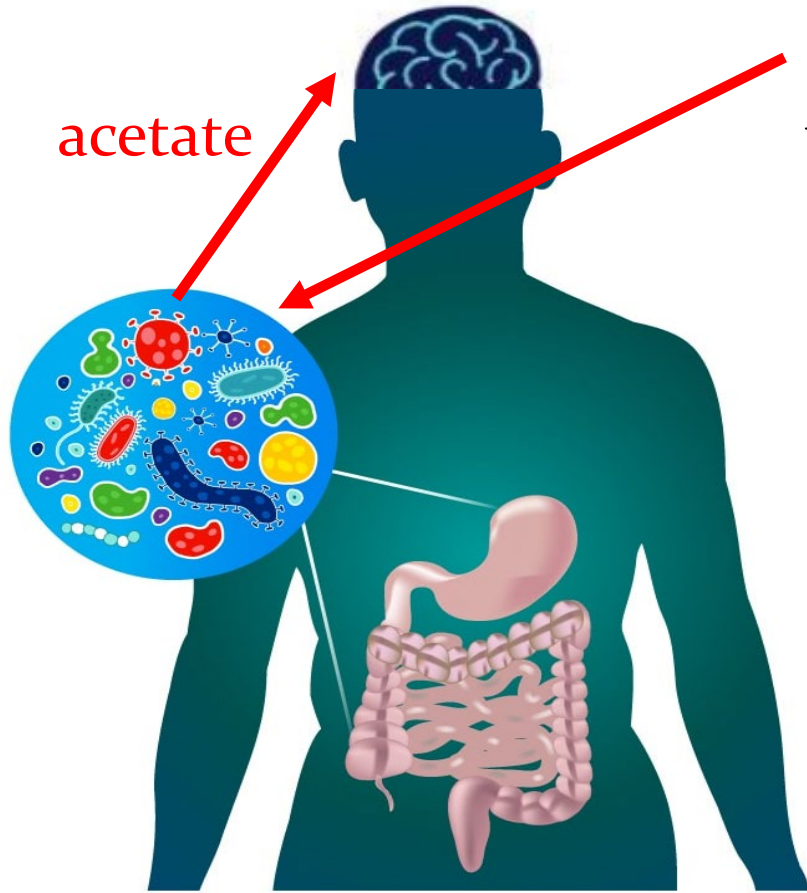
 **frontiers**
in Physiology 2020

Acetate Revisited: A Key Biomolecule at the Nexus of Metabolism, Epigenetics and Oncogenesis

“Acetate is a major end product of bacterial fermentation of fiber in the gut.

Acetate, whether derived from the diet or from fermentation in the colon, has been implicated in a range of health benefits”.

Vinegar and the Gut Brain Axis (emerging research)



Healthy gut microbiome: healthy balance of beneficial bacteria

Probiotics: yogurt and sauerkraut – foods that promote beneficial bacteria in your gut

Prebiotics: fiber, beans, whole grains, and vegetables – feed the beneficial bacteria

Postbiotics: healthful metabolites produced by beneficial gut bacteria

Novel role of vinegar for improving mood

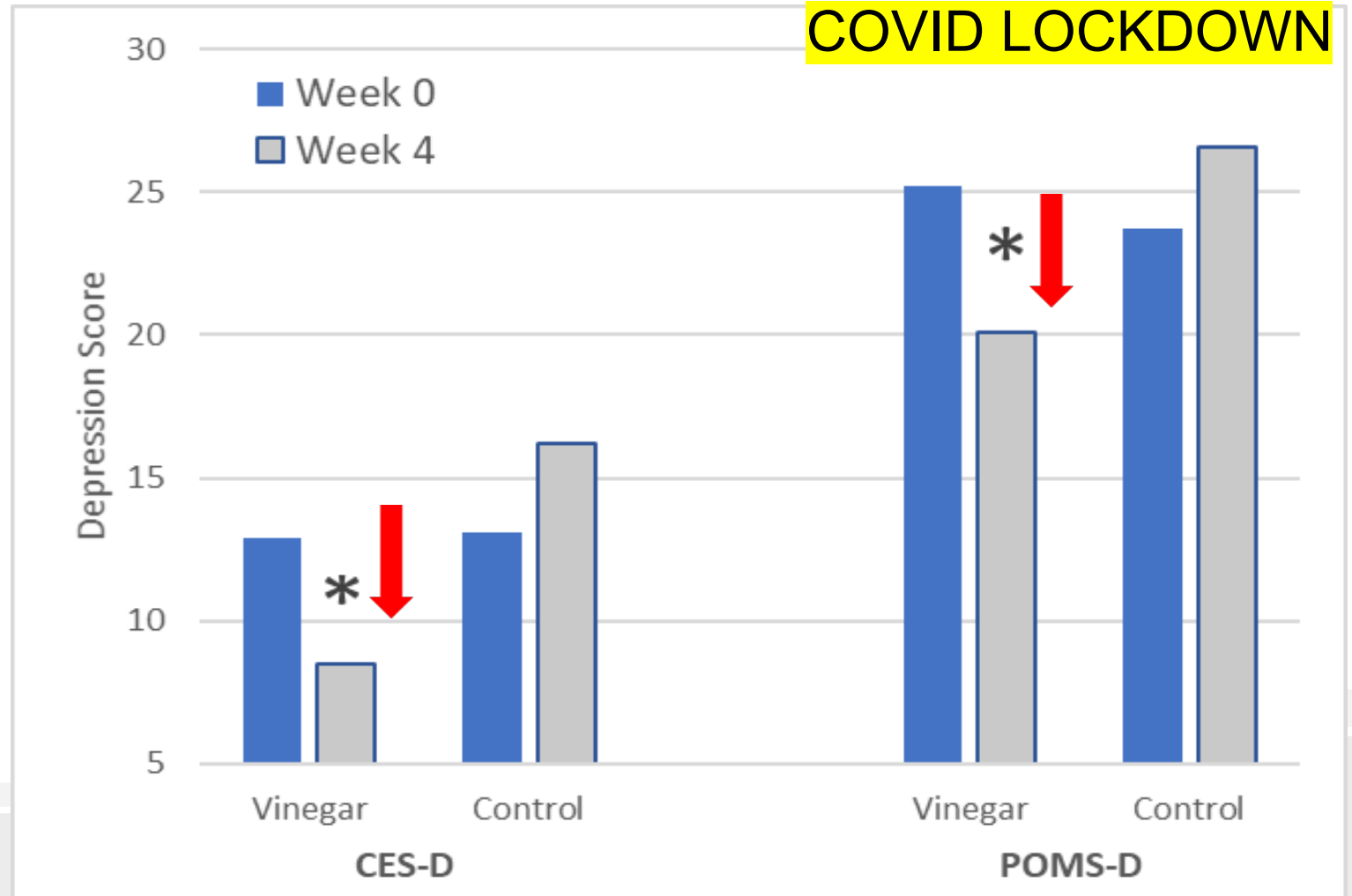
2021

Participants consumed vinegar (4 tbsp daily) or placebo for 4 weeks.

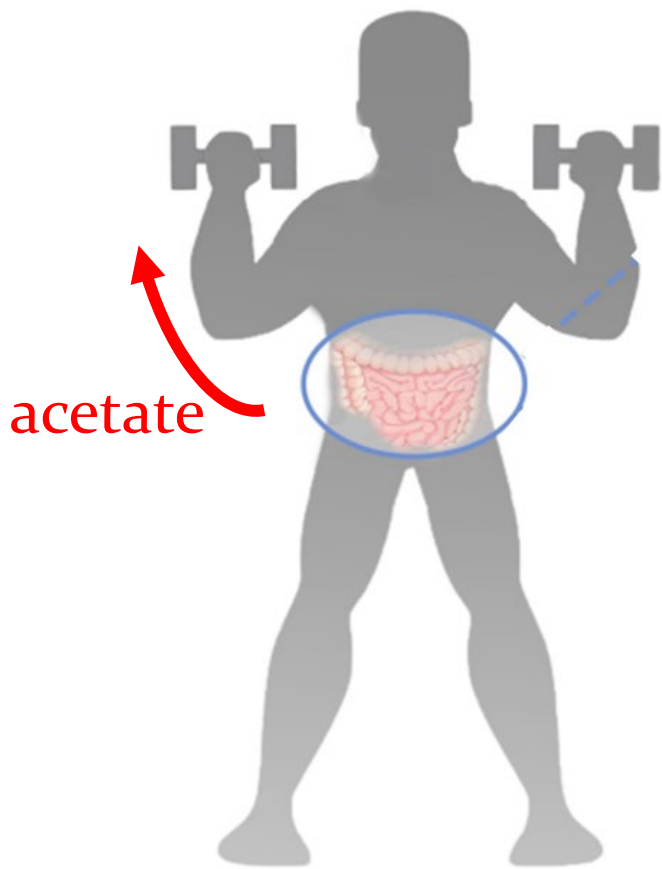


CES-D: a self-report depression scale for research in the general population

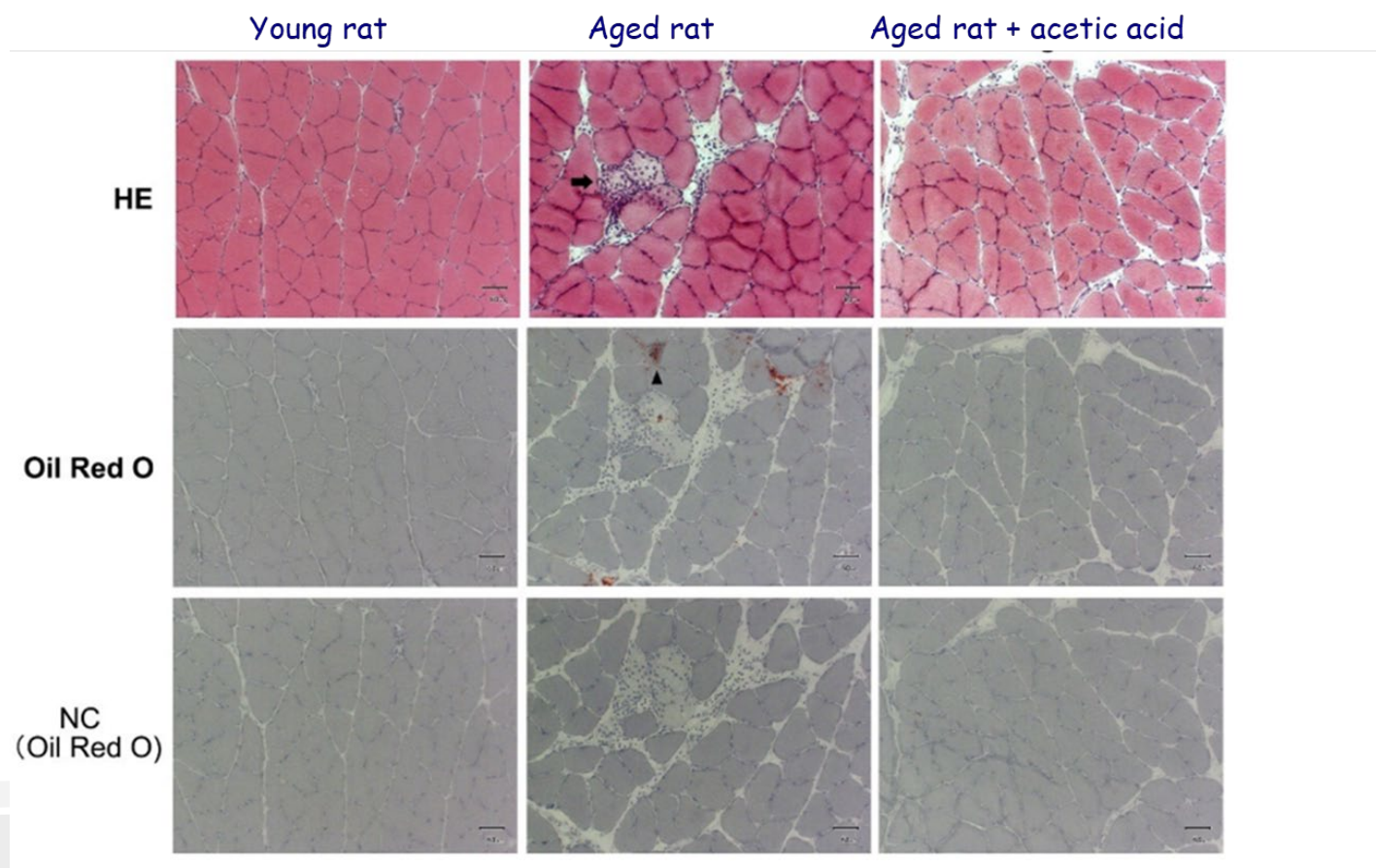
POMS-D: a scale to assess depressed mood among general populations and patient groups



Vinegar and the Gut Muscle Axis (emerging research)



Effect of Long-Term Supplementation with Acetic Acid on the Skeletal Muscle of Aging Sprague Dawley Rats

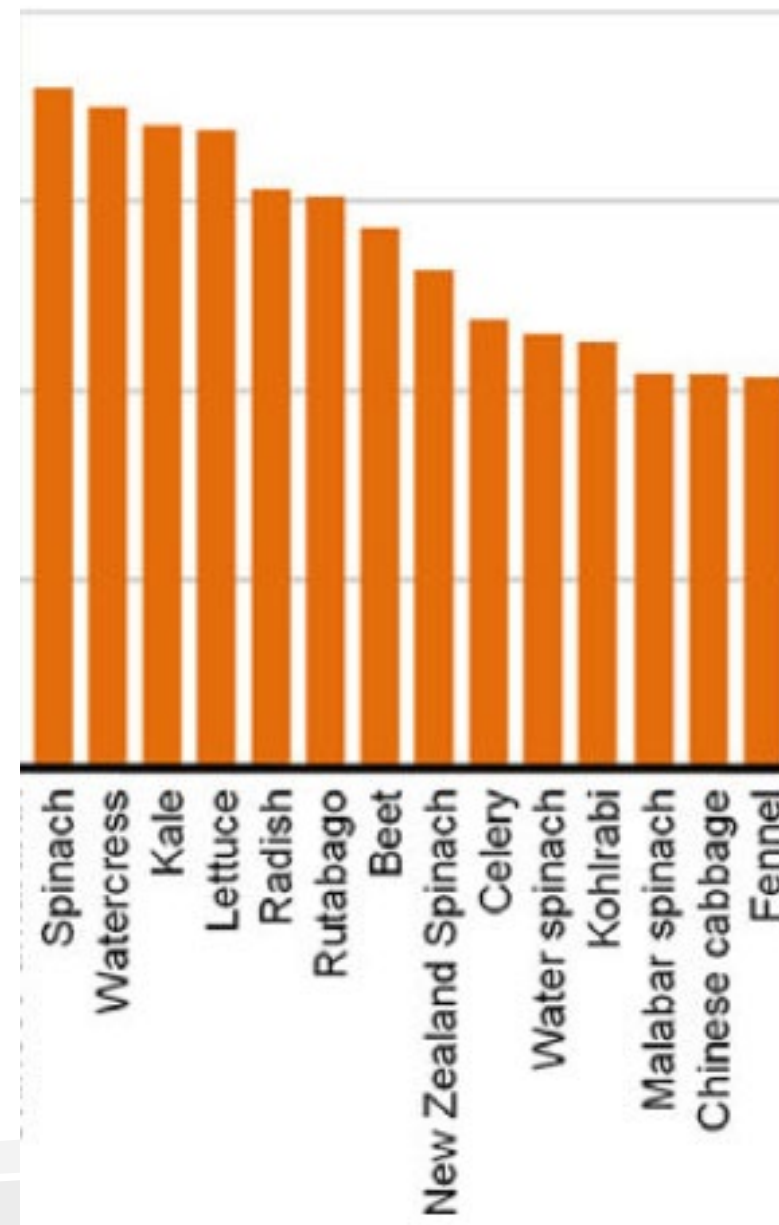


Simple effective adjunct therapy



Beet Root Juice

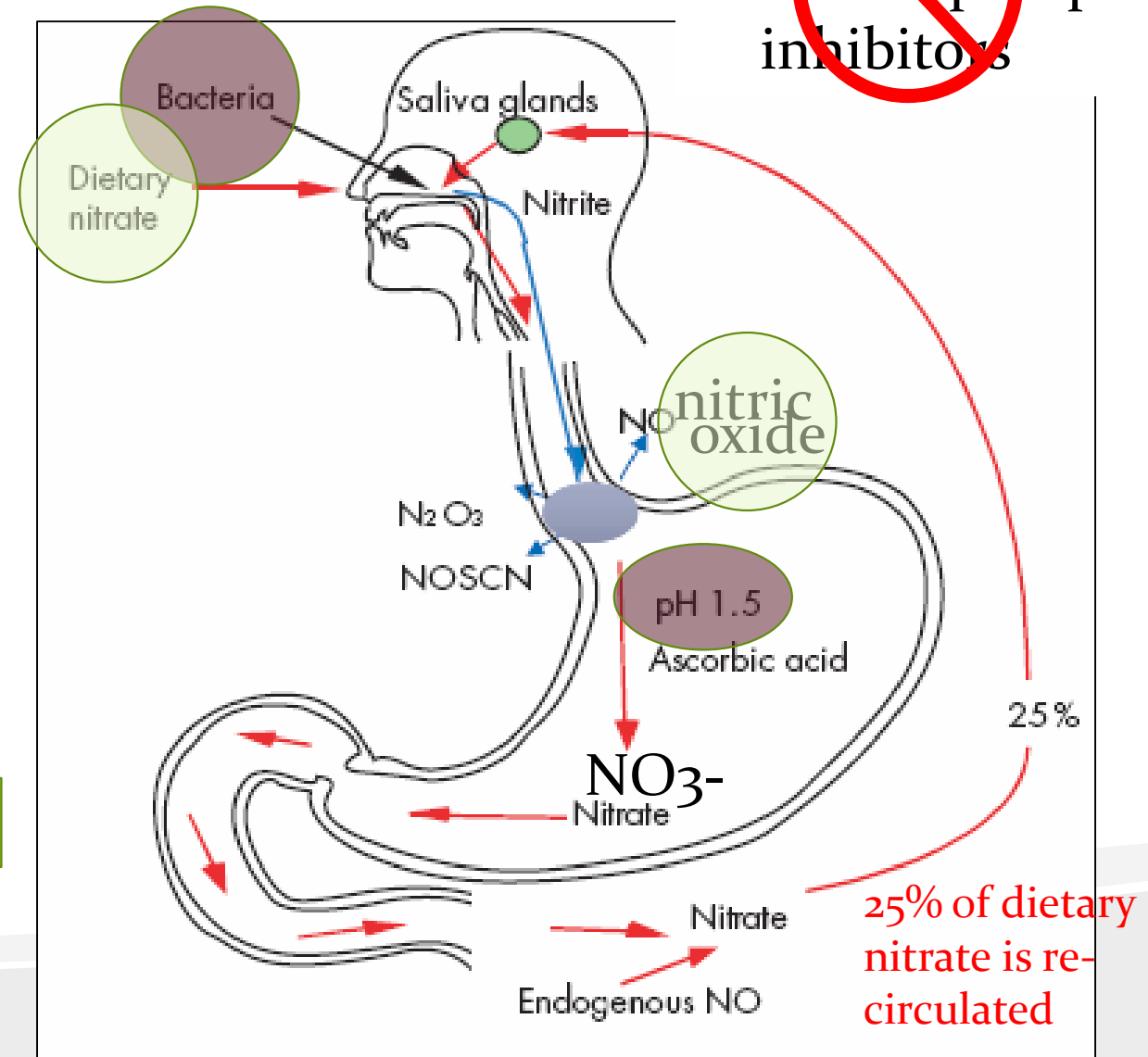
- Vegetable-rich diets are linked to reduced risk for CVD. Nitrate (NO_3^-) is one constituent of plant foods linked to improved vascular health
- Leafy green salad – 100 mg/serving
- Concentrated beet root juice – 400 mg/shot



NO_3^- and NO

- taken up by salivary glands and reduced to nitrite by the reducing bacteria on the dorsum of the tongue
- the nitrite in the swallowed saliva is immediately converted to nitrous acid and nitrosating species such as N_2O_3 , NO + when encounter acidic gastric juice

- Mouthwash
- Proton pump inhibitors

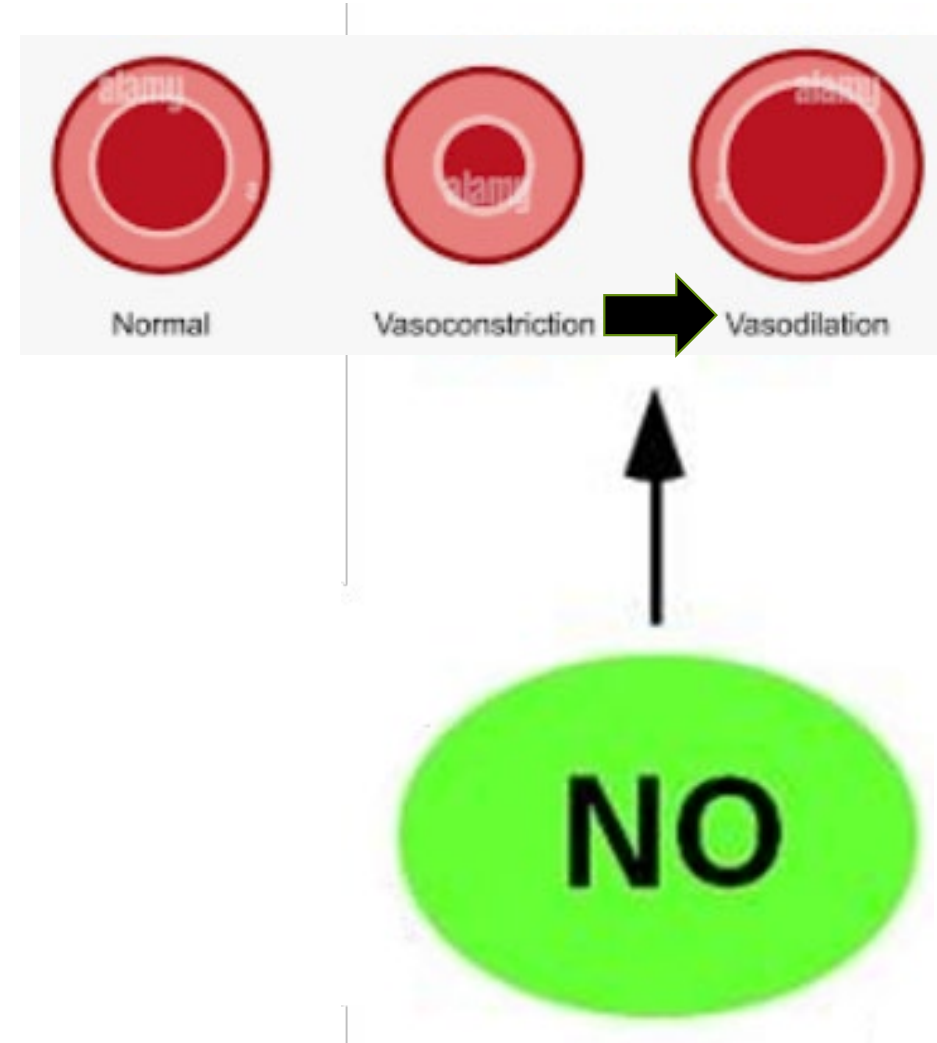




NO (nitric oxide)

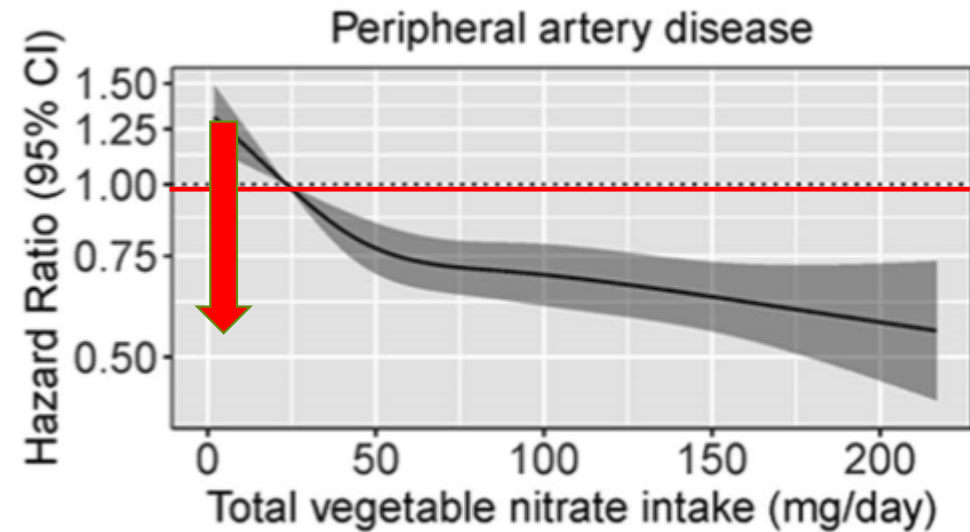
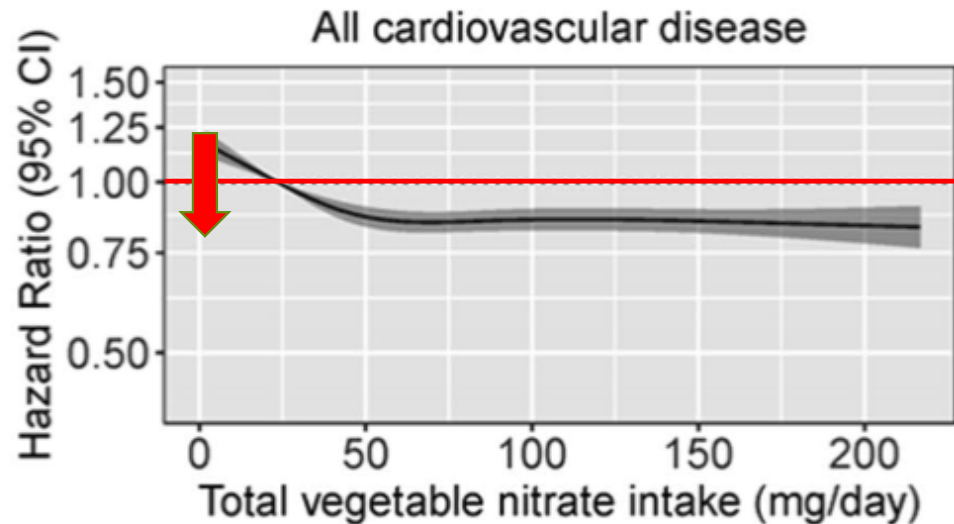
- NO promotes vasodilation of blood vessels reducing blood pressure
- Common blood pressure drugs:
 - Amlodipine (Norvasc)
 - Lisinopril (Prinivil, Zestril)
 - Valsartan (Diovan)

>20 million US adults



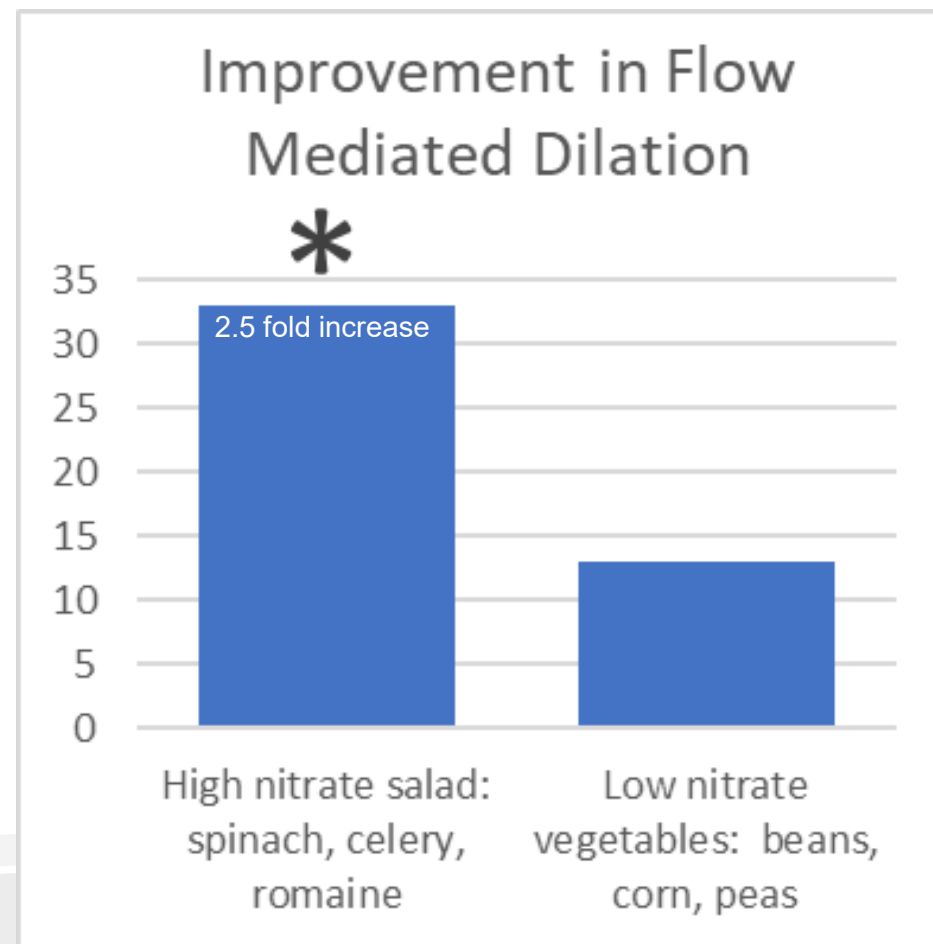
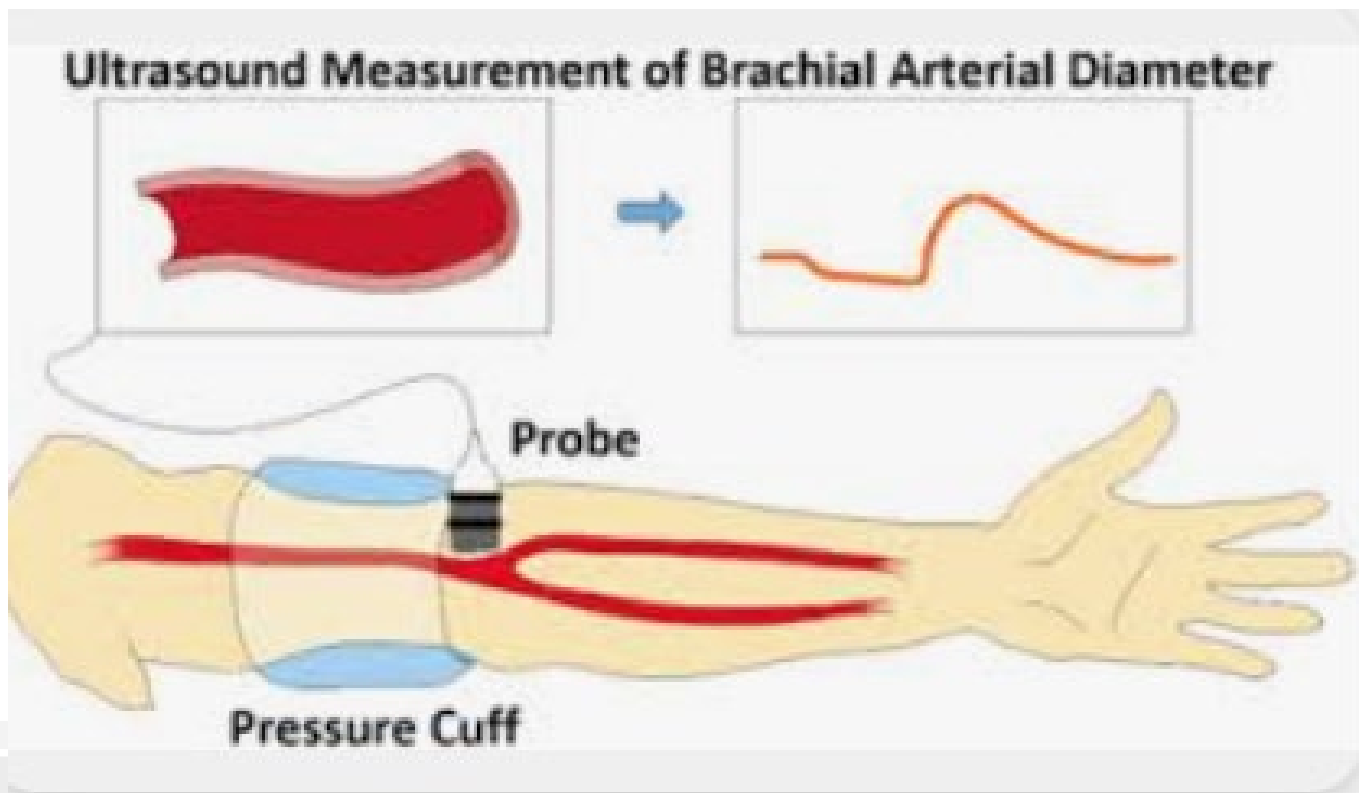
Nitrate-rich salad

- Danish Health Study - 53,150 participants without CVD at baseline
- Vegetable nitrate intake [lettuce (41%), potato (22%), celery (10%), carrot (5%), and spinach (3%)] inversely associated with blood pressure at baseline and reduced incidence of CVD over 23 years



ASU Study in Post-menopausal Women

Controlled crossover trial was to assess the feasibility of consuming a high-nitrate, leafy green salad twice daily for 10 consecutive days on measures of cardiovascular health in postmenopausal women





Nitrate with simple changes



Spinach salad



Radish and celery salsa

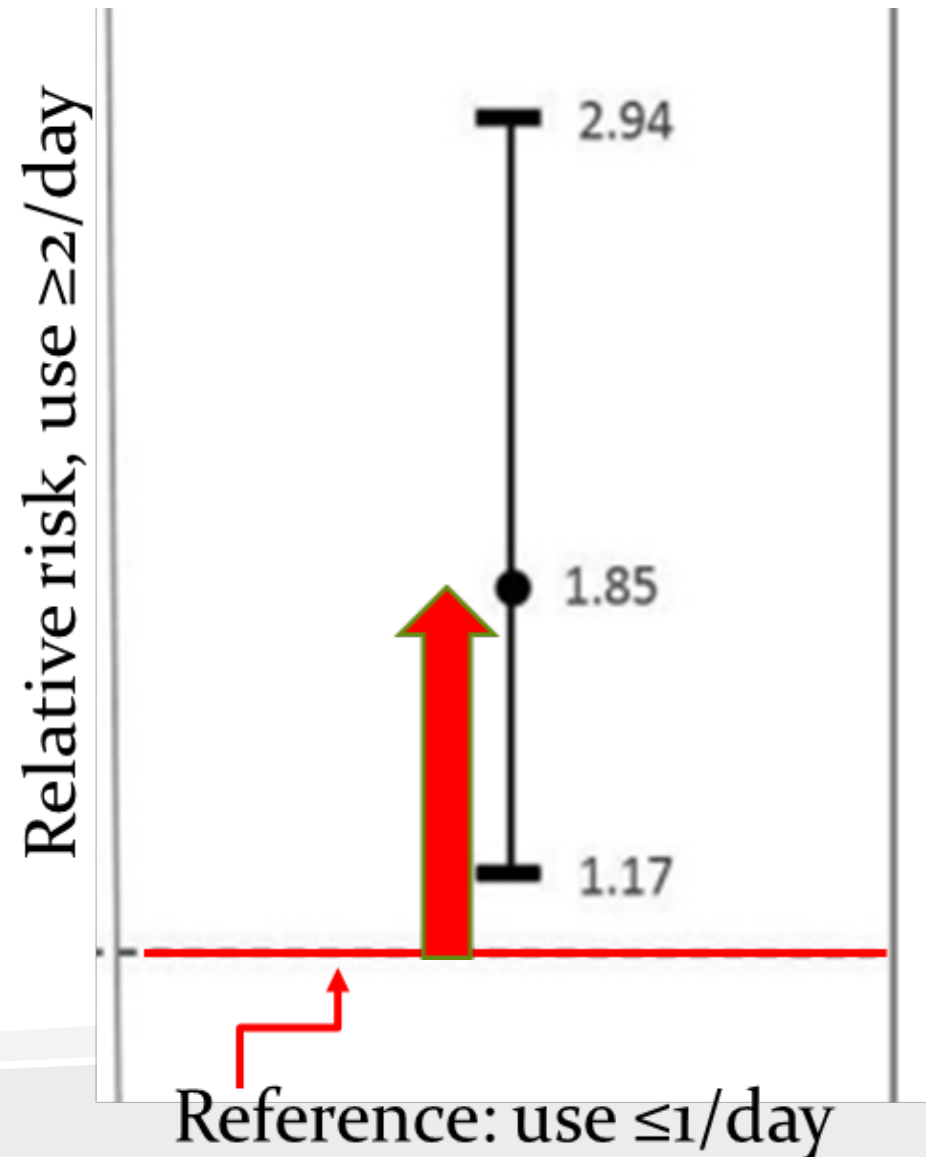


Roasted beet
salad



Mouthwash

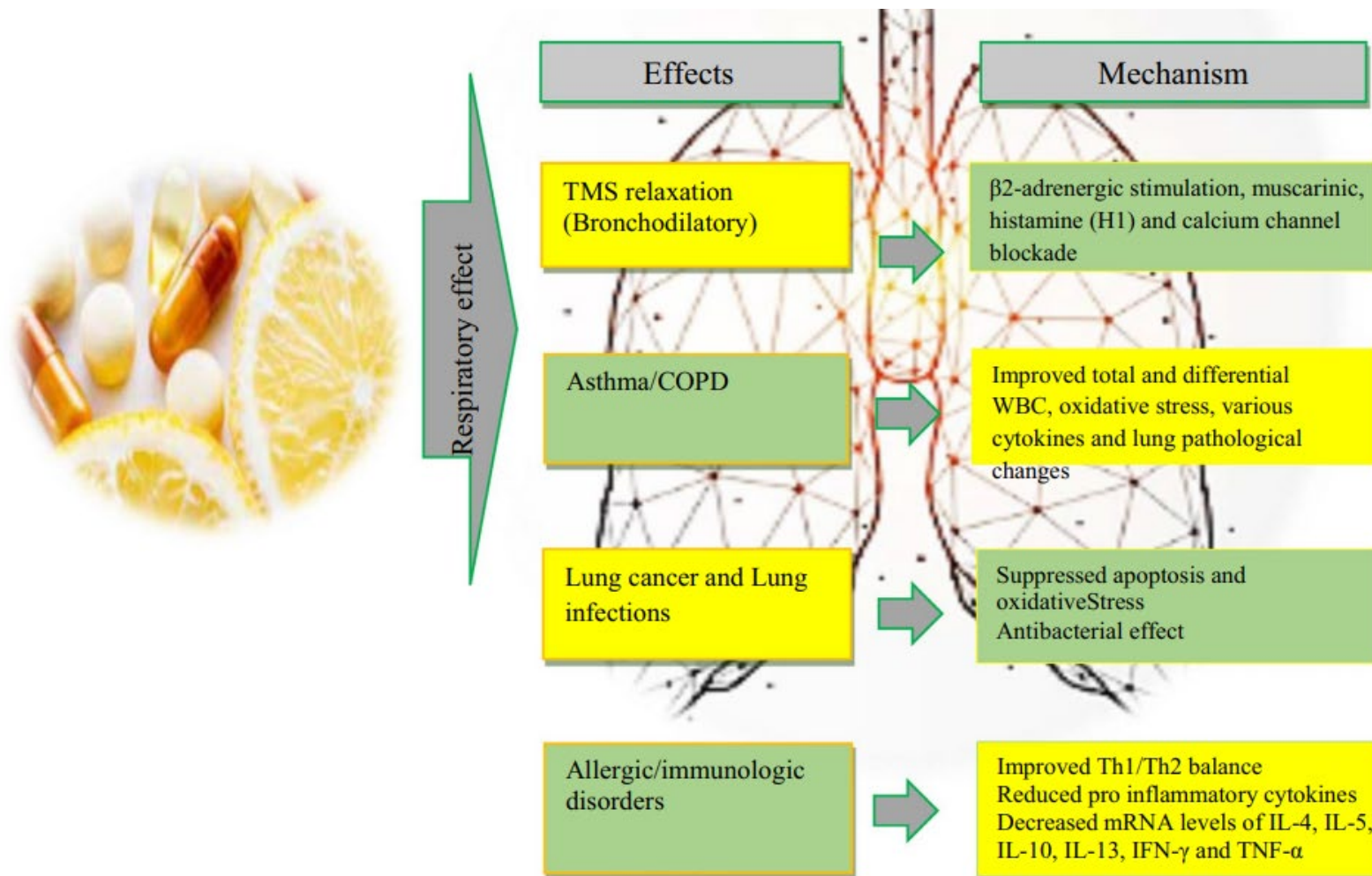
People who used mouthwash twice/day or more had higher incidence of hypertension compared to less frequent users (+85%)



Vinegar + Nitrate rich foods



Vitamin C and Respiratory conditions



A 2023 experimental and clinical-based review concluded:

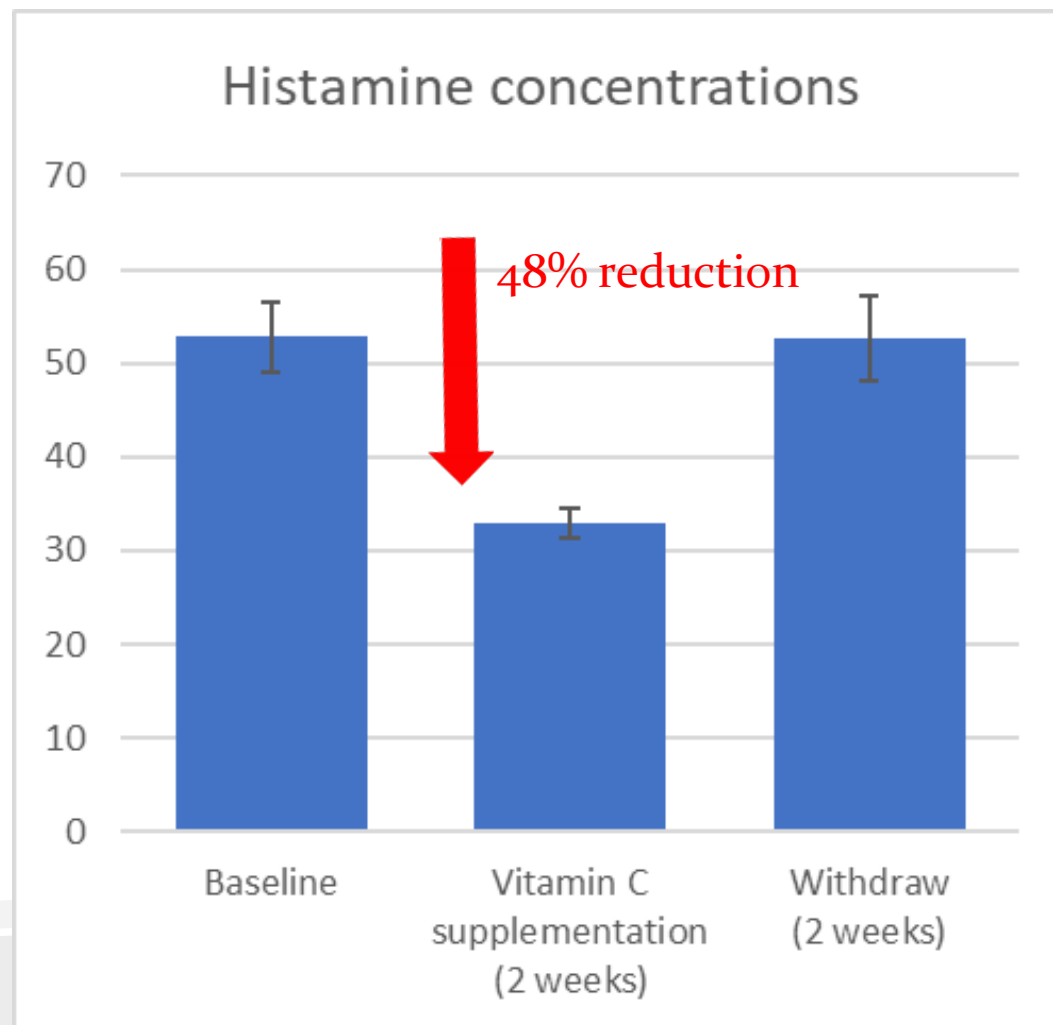
Vitamin C can be used a preventive and/or relieving therapy in respiratory diseases



Vitamin C – an effective antihistamine

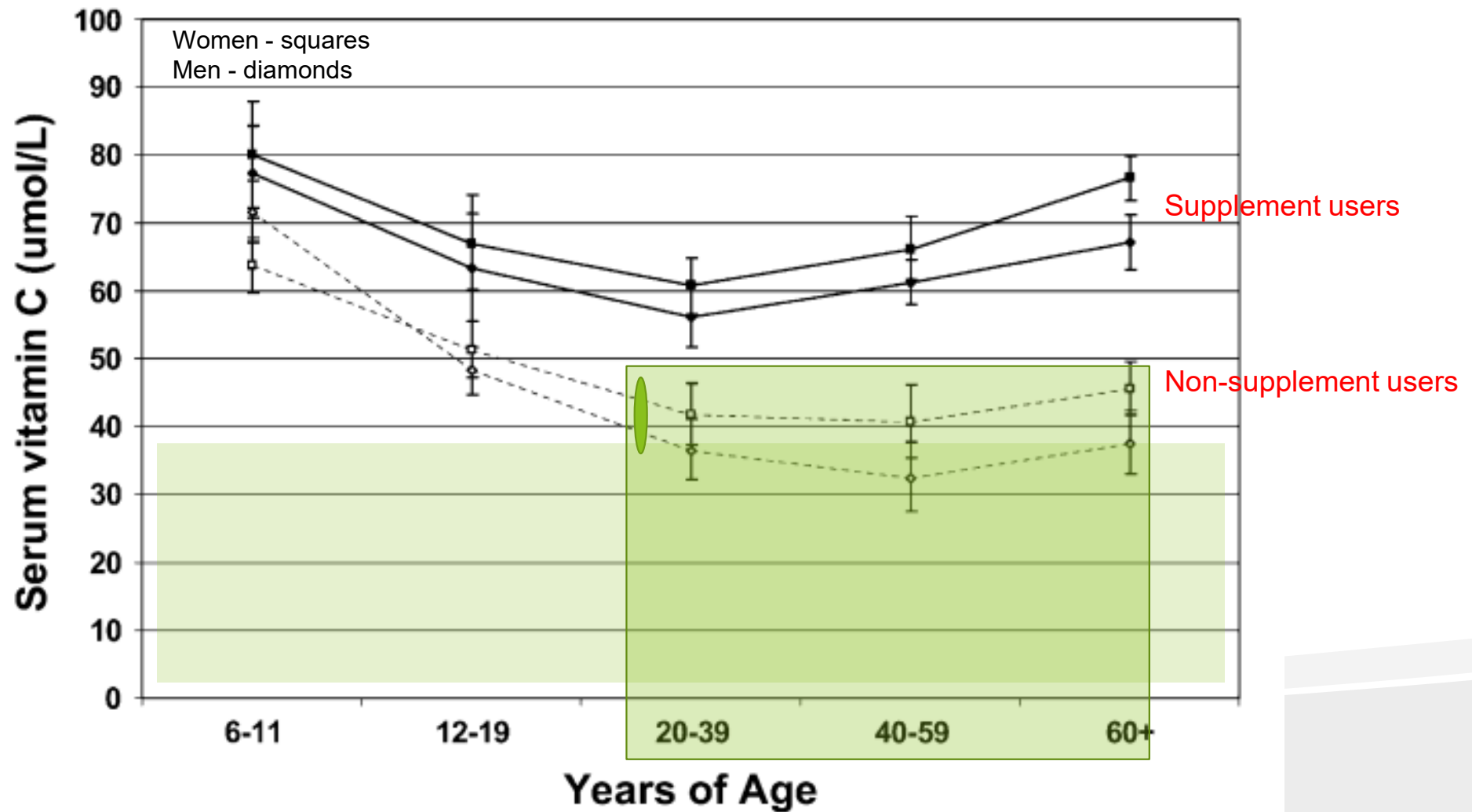
ASU study:

10 participants consumed placebo for 2 weeks, vitamin C for 2 weeks (2 g/day), and placebo for the final 2 weeks.



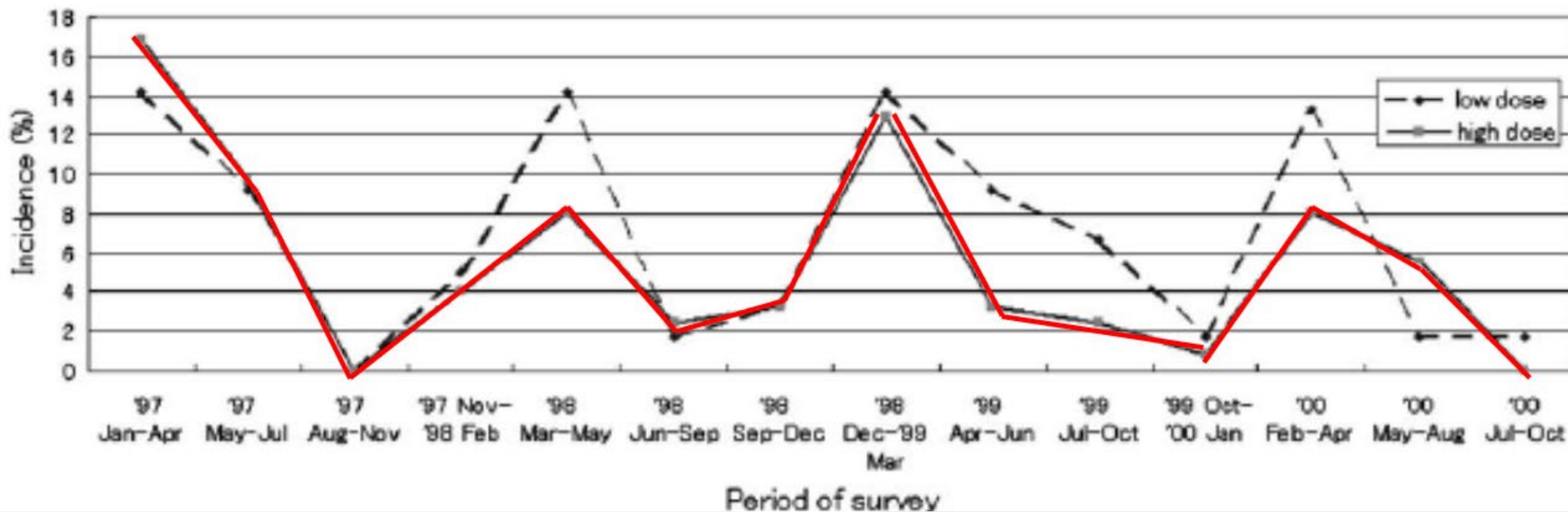


Vitamin C status of American adults



Vitamin C and the Common Cold

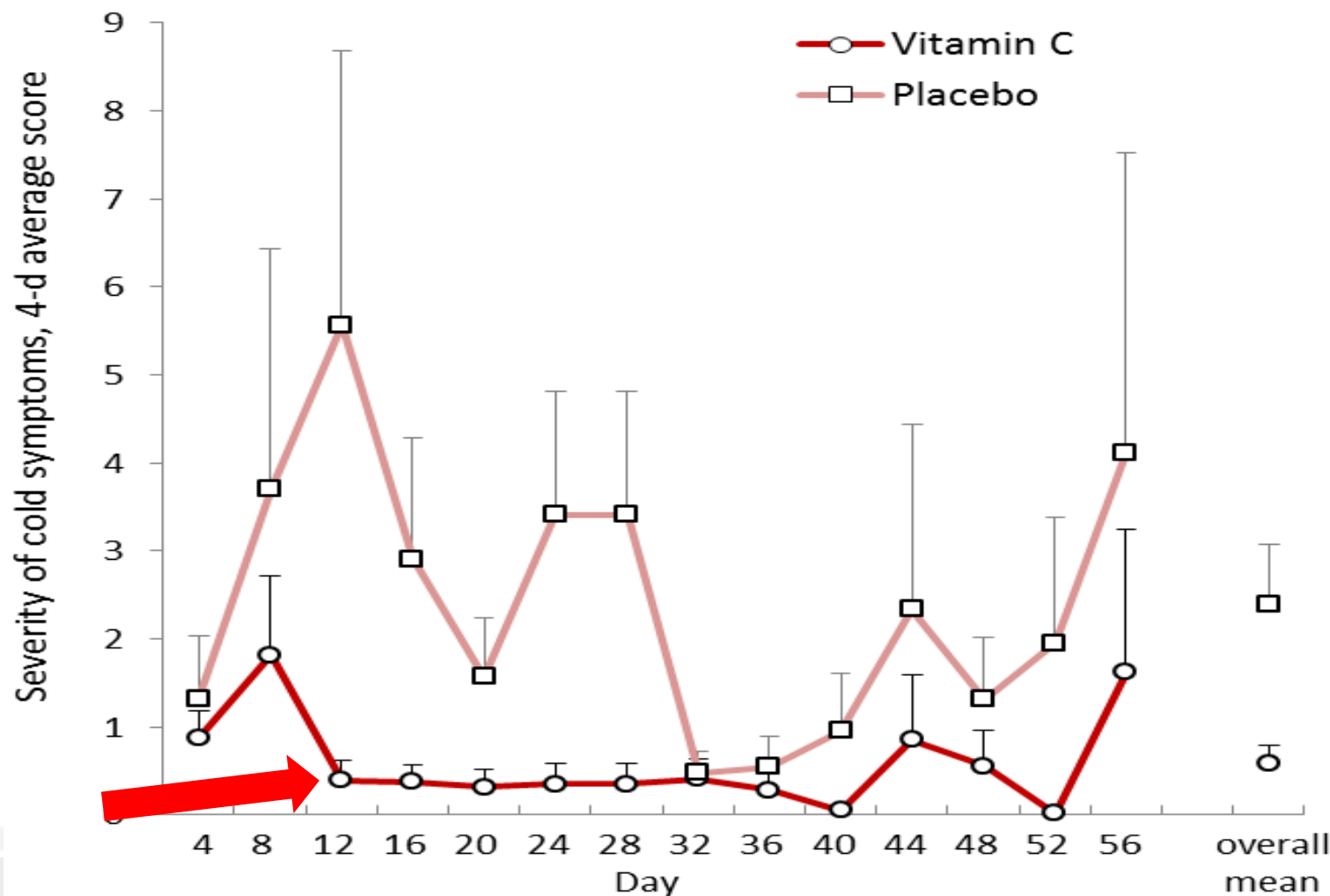
Total number of common colds (per 1000 person-months) was **21.3** for low-dose group (50 mg/d) and **17.1** for high-dose group (500 mg/d) [**20% reduction in colds with high VC**]



Vitamin C and the Common Cold

ASU: RCT (n=30)

Vitamin C supplementation
(1000 mg/d for 8 weeks)
reduced cold incidence by 45%
in college men with marginal
vitamin C status

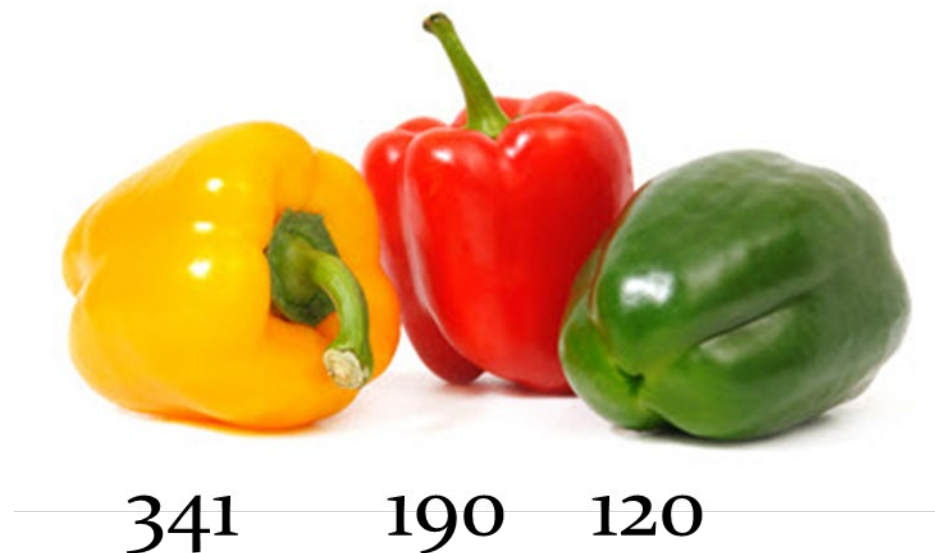




Vitamin C – only certain fruits and vegetables

RDA = 90 mg

Antihistamine effect = 500-1000 mg/d



#1

The Mediterranean Diet

The most prominent fruits and vegetables on the Mediterranean diet include:

tomatoes, olives, cucumbers, bell peppers, eggplant, zucchini, artichokes, leafy greens like kale and spinach, broccoli, carrots, onions, garlic, lemons, oranges, grapes, figs, dates, and pomegranates.

Hence – this diet is particularly rich in nitrates and vitamin C





The Mediterranean Diet and Vinegar

WebMD (2022): Red wine vinegar is a staple ingredient in Mediterranean cooking. It's known for its delicious and distinctive tangy flavor. Red wine vinegar is a popular choice for vinaigrettes and is also frequently used in marinades and pickling solutions.

BottomLineInc (2018): Vinegar had its place in the classic Mediterranean diet. There are a variety of vinegars—from balsamic to apple cider to red wine—that can be mixed with olive oil to make salad dressings. There is no known difference in the health properties of vinegars.

Business Insider (2024): Vinegar is a Mediterranean-diet staple and an easy swap for just about any sauce. You can switch out ranch dressing for some oil and vinegar on your salads or add the ingredient to your soups to give them a lighter and tangier flavor.



Thank you!

Questions??