Unlocking the Cardiovascular Benefits of Tea

January 27, 2021

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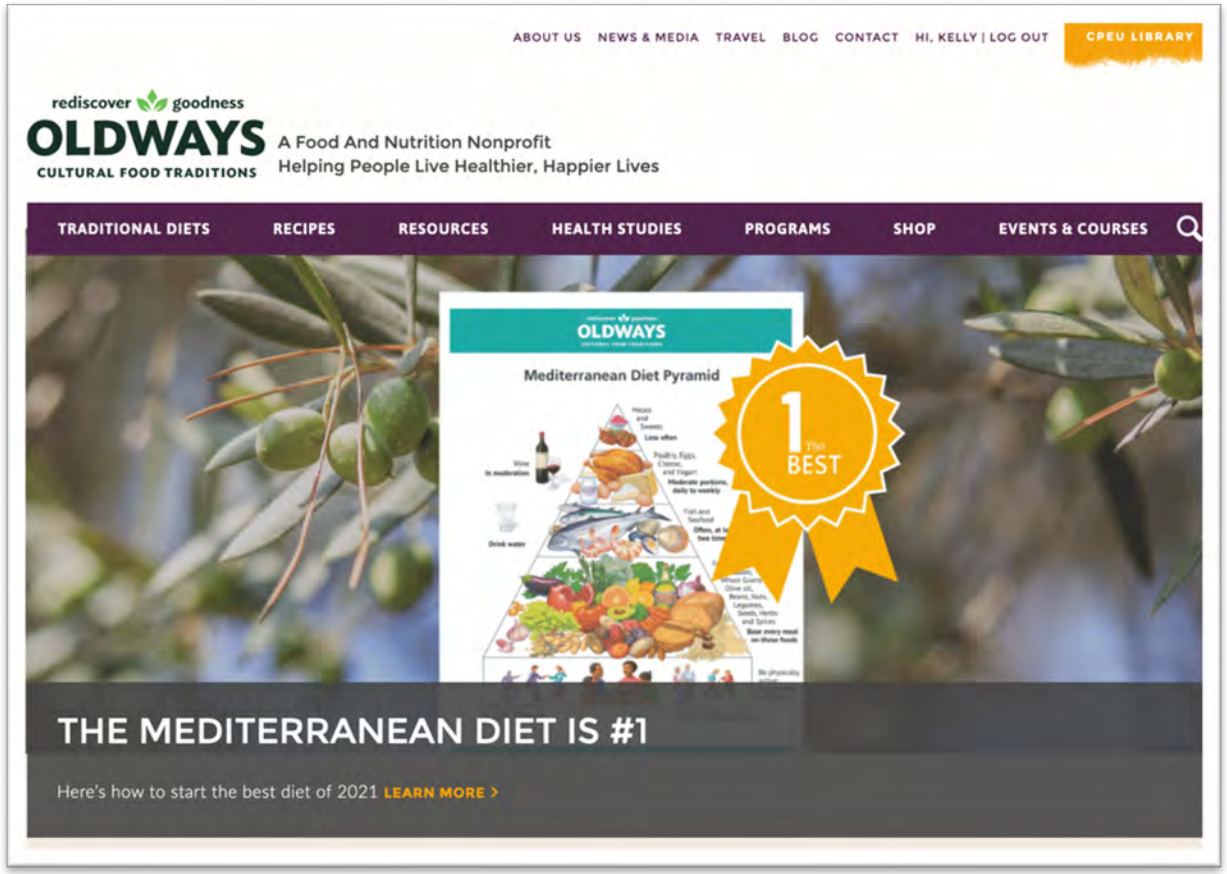
OLDWAYS

About Oldways

- Nutrition nonprofit founded in 1990
- **Mission**: To inspire people to embrace the healthy and sustainable joys of the old ways of cooking and eating
- Visit us online at **oldwayspt.org**



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Housekeeping

- Attendees will receive an email within ONE WEEK with **CPEU certificate**, **slides**, and **recording**
- Visit **oldwayspt.org** and click on “CPEU Library” in the top-right corner to register for upcoming webinars or view recordings of previous webinars
- Please submit any questions using the CHAT function in Zoom

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Today's Speakers

Alex White

Joy Dubost,
PhD, RD, LD

Taylor C. Wallace,
PhD, CFS, FACN

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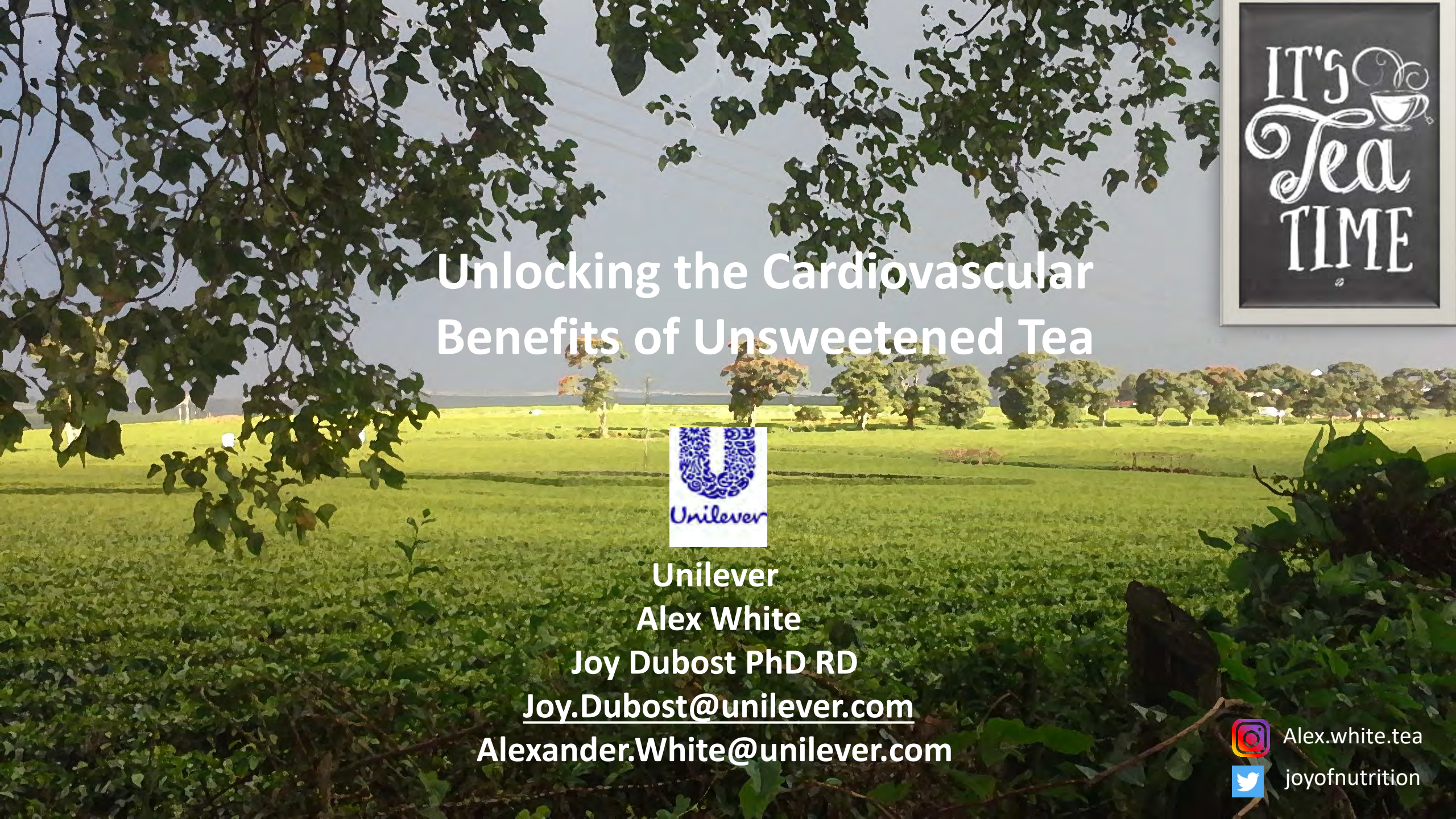

Unlocking the Cardiovascular Benefits of Unsweetened Tea

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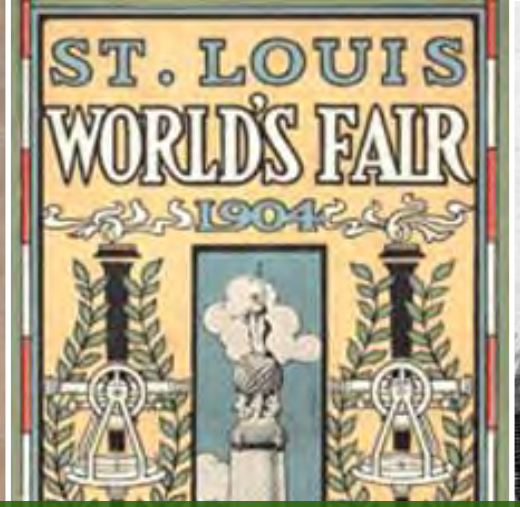
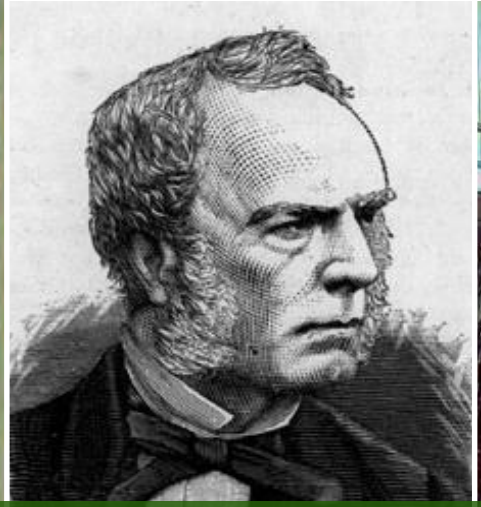
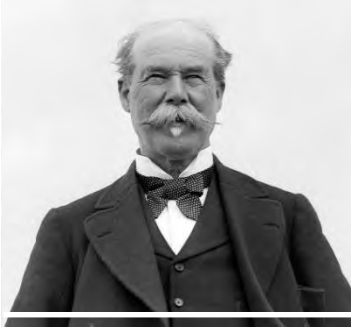
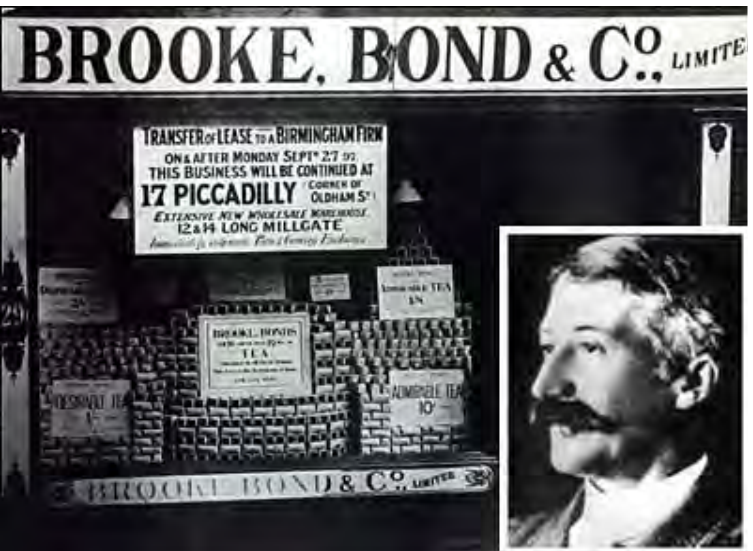
Alex.white.tea
joyofnutrition

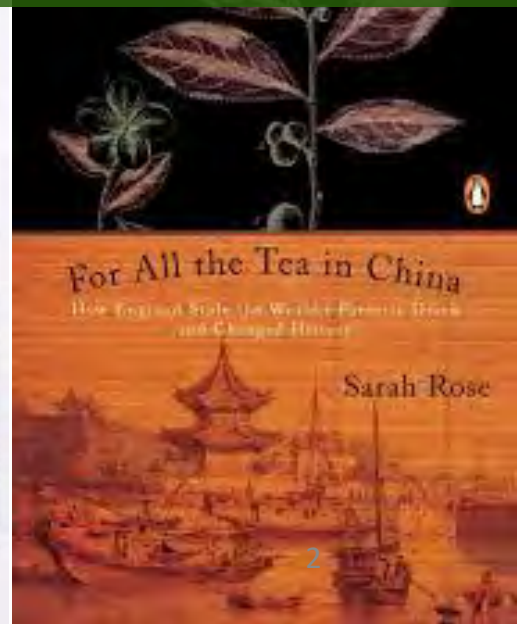








TEA: No Other Beverage is so Deeply Rooted in the Historical Heritage and Social Fabric of Humanity



The rituals: More than just a drink, different tea traditions are now famous around its preparation, presentation, and consumption and are deeply rooted in many world cultures.









What is tea? There are two broad categories:

True Tea

- **Made with leaves of the C. Sinensis plant**
- **Two main varieties of the C. Sinensis plant exist: *var.assamica* and *var. sinensis***
- **Thousands of different cultivars**

Black Tea

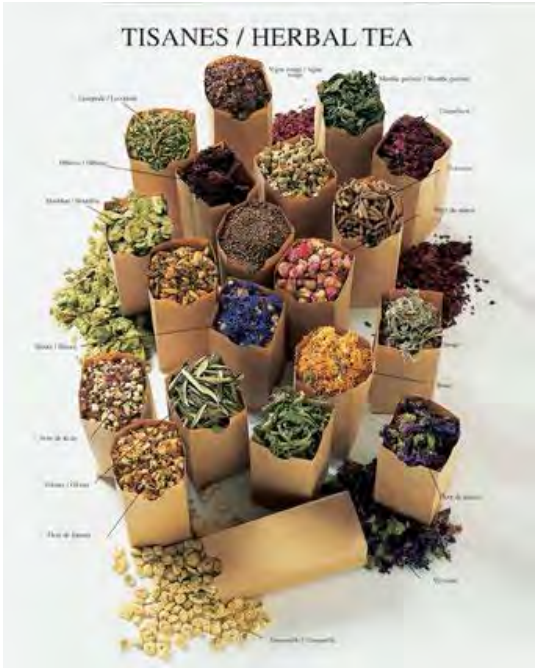
Green Tea

White Tea

Oolong Tea

Tisanes & Non-Tea

- Made from flowers, herbs and plants other than C. Sinensis
- Offer distinct flavors & some are thought to have medicinal properties



Chamomile

Mint

Mate

Rooibos

TEA FACTS.

Most Widely Consumed Beverage in The World Next to Water
60 Billion Servings of Tea, Over 2.8 Billion Gallons*

On any given day, **127 Million** people in USA drink Tea

70% of Tea Consumed in America is **ICED**

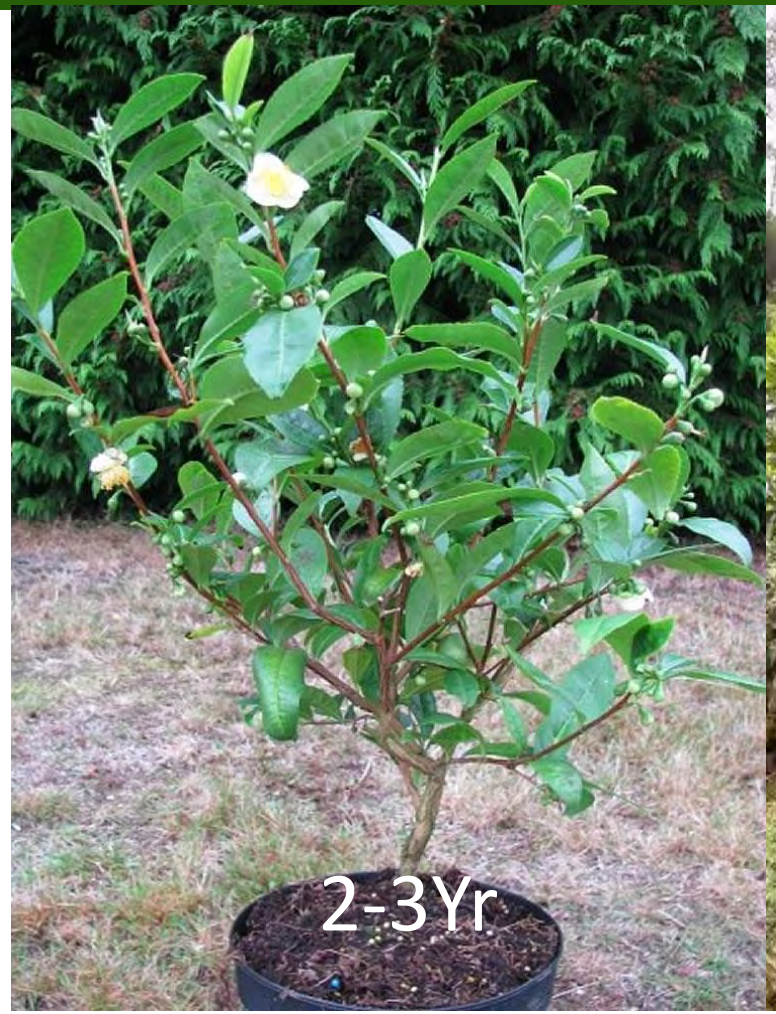
LOVES:

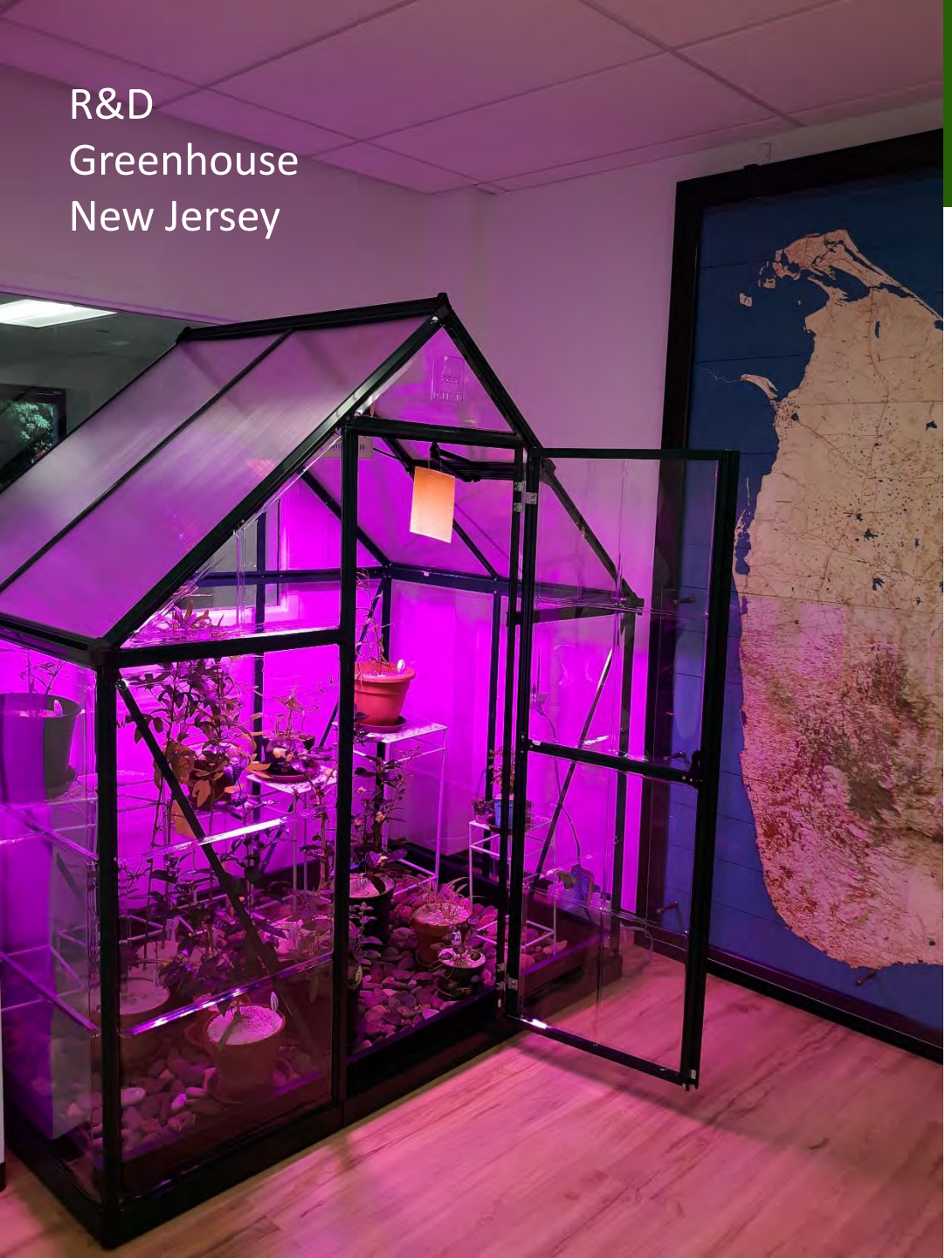
- Well drained acid soil
- Proximity to the equator
- Lots of rain
- Clean air
- Sun

HATES:

- Soggy soil
- Alkali soil
- The R&D Lab

The Camellia Sinensis is just one plant generating all teas (black, green,white, yellow, oolong, pu-her, Matcha, etc.).
Farmed as a bush for easy harvest,
it will grow into a tree in the wild.





Tea propagation is achieved either from seed or from cuttings

CUTTINGS:

Pros:One of the main reasons to take cuttings is that they are identical to the mother plant and can replicate their most vigorous, high yielding plants over and over again.

Cons: Problems can arise with fighting off environmental stresses, diseases and insects, as the genetics somewhat weaken.

Camellia sinensis seeds

Germinated seedling

Potted seedling

SEEDS:

Pros: More biodiversity, growing from seed lessens the chances of inheriting any pests or diseases from a cutting.

Cons: germination rates vary by plant species, harvest times are longer than when starting from cuttings, and sometimes there are costs associated with purchasing them (whereas clones taken from plants are free).

One Plant, many types of tea Owing their definitive differences to:

- Where they are grown
- How they are picked
- How they are processed

MAIN TEA TYPES:

White Green Oolong Black Pu Erh

Matcha

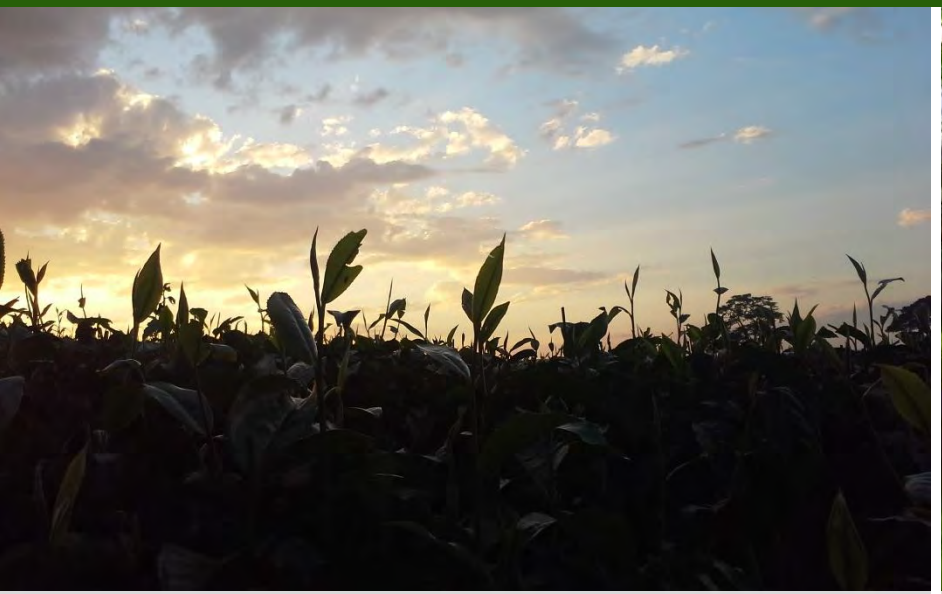
FLAVORED TEA:

Chai

Earl Grey

Jasmine tea

WHERE DOES TEA COME FROM (and why does it matter?)



Tea estates are often nestled in beautiful pristine preserved environments, where soil properties, altitude, latitude, or even proximity to other vegetation, will impart the tea with a pure distinctive signature character, un-replicable anywhere else. Tea tasters call it “origin character”; it is essentially the passing on of those territories and environment into the tealeaf itself.



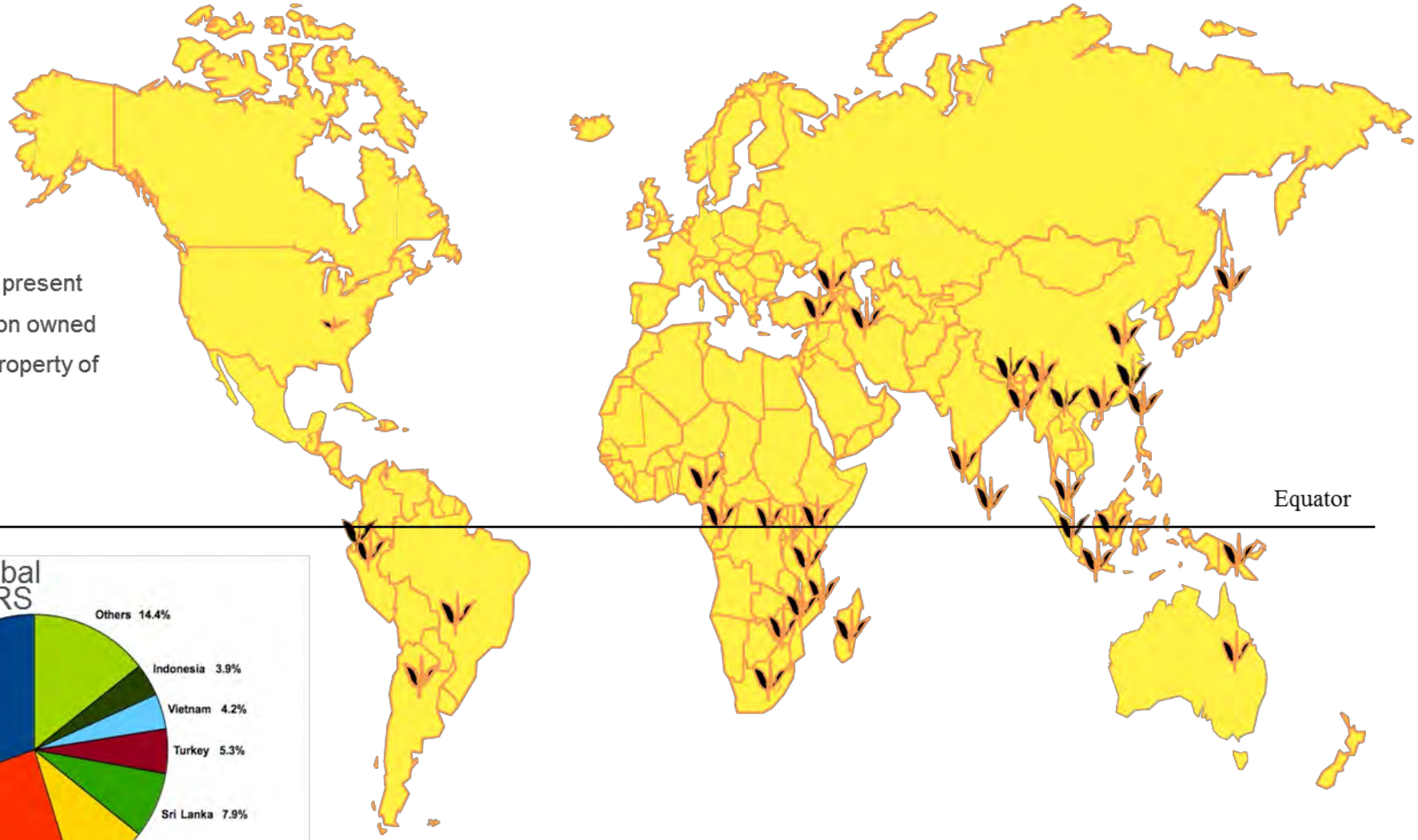
Where true tea is grown

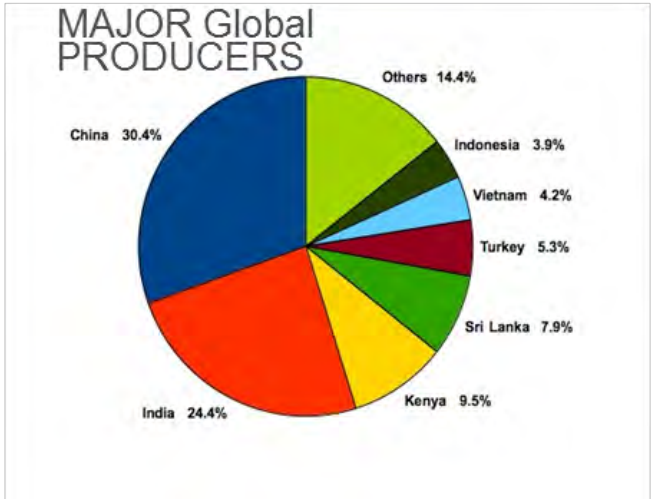
Major Origins for Unilever NA:

- Argentina
- Malawi
- Indonesia
- India

Kenya

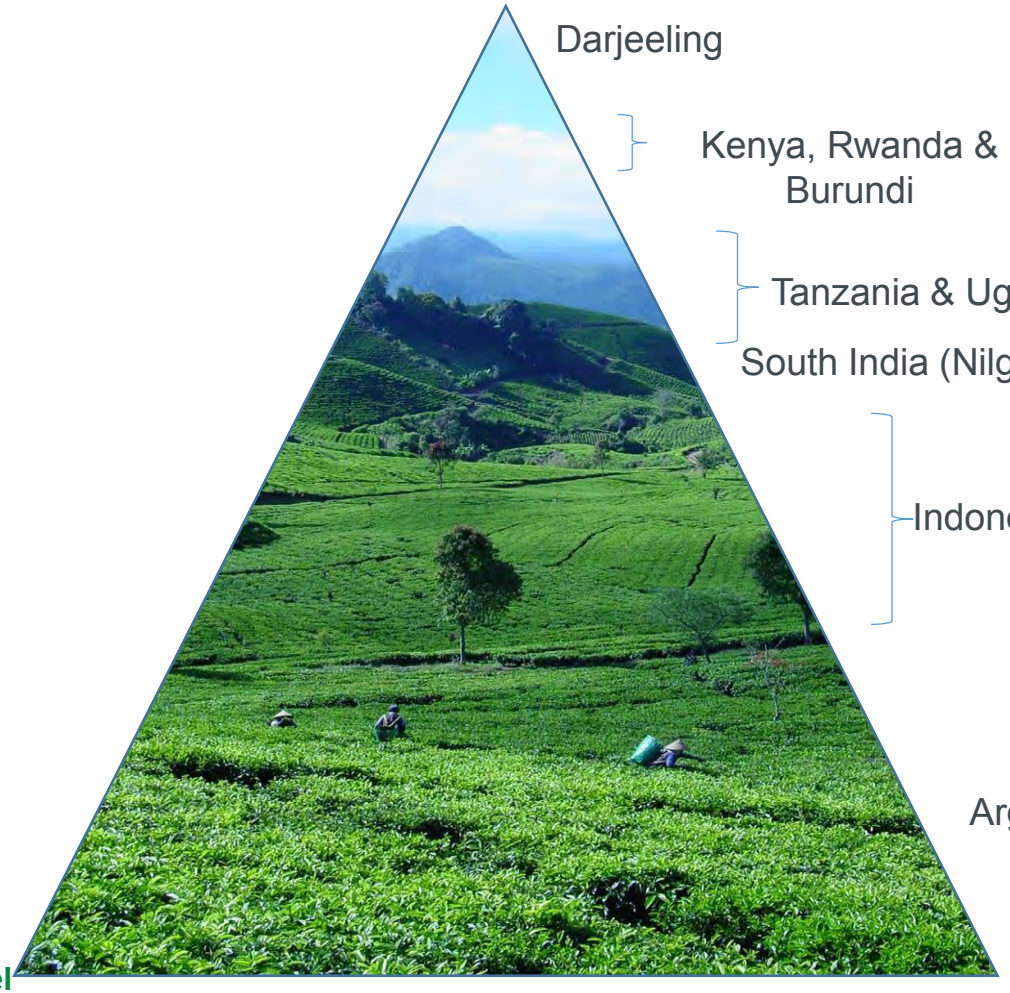
A small plantation is present in US (SC) was Lipton owned till 1987. Currently property of Bigelow





World production approx. 5M tons

Tea Growing Elevations



8,000 ft

4,000 ft

Sea Level

Darjeeling

Kenya, Rwanda & Burundi

Tanzania & Uganda

South India (Nilgiris Hills, Munnar)

Indonesia

Malawi, Zimbabwe

Argentina

North India, Vietnam & Bangladesh

Sri Lanka

High Grown

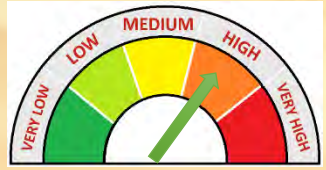
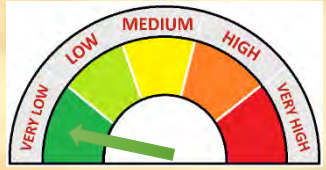
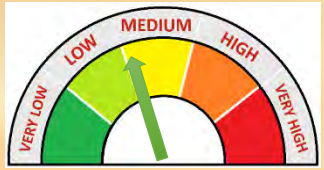
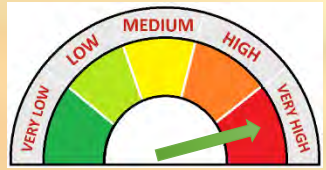
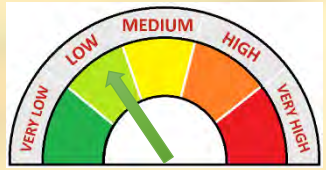
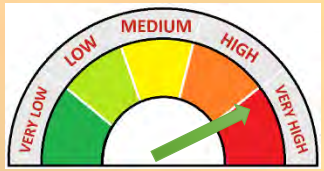
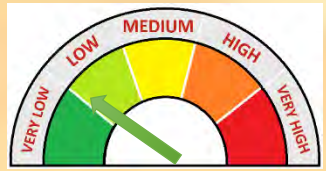
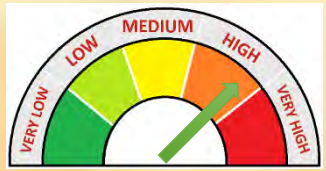
Medium Grown

Low Grown

Flavor, Aroma

Body, Colour

WHAT DOES EACH PROVENIENCE BRING TO THE TEA?
AN EXAMPLE FROM A TYPICAL ICED TEA BLEND

		TASTE	COLOR	BITTERNESS
Argentina	Mellowness, Clarity and sparkle			
Malawi	Color, deep red hues			
Kenya	Taste, “Briskyness”			

HOW IS TEA HARVESTED?

Tea Plucking is together hard work and a skill. Whether by hand or by machine, tea needs to be selectively plucked from an emerging flush, to give the desired results in the blend.

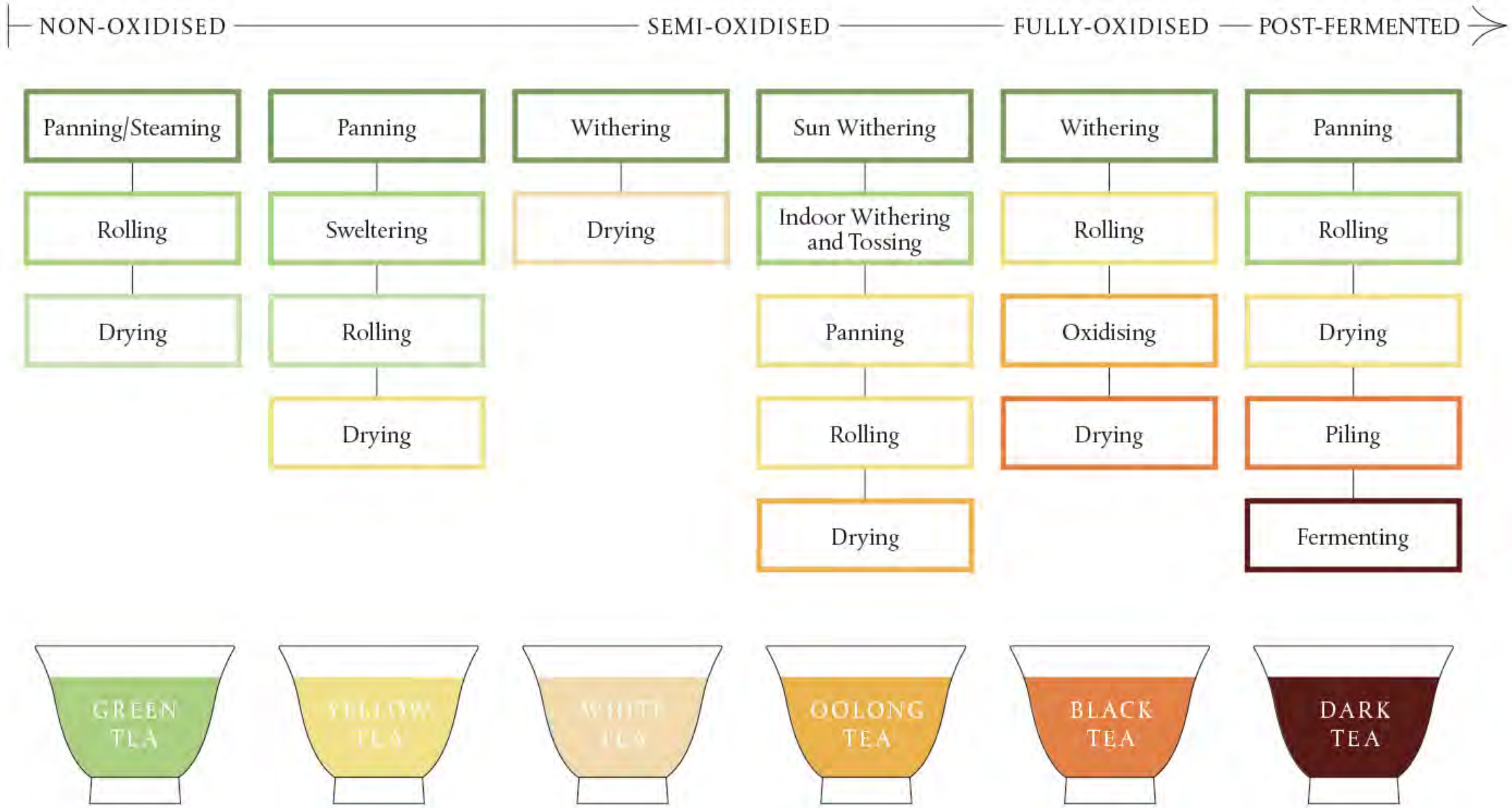
Tea Processing in factories is done in the immediate proximity of the field to maintain the leaf as fresh and intact as possible and occurs within 24h of picking. The process is really a craft, requiring nothing more than experience, air and heat.








Tea processing flow diagram



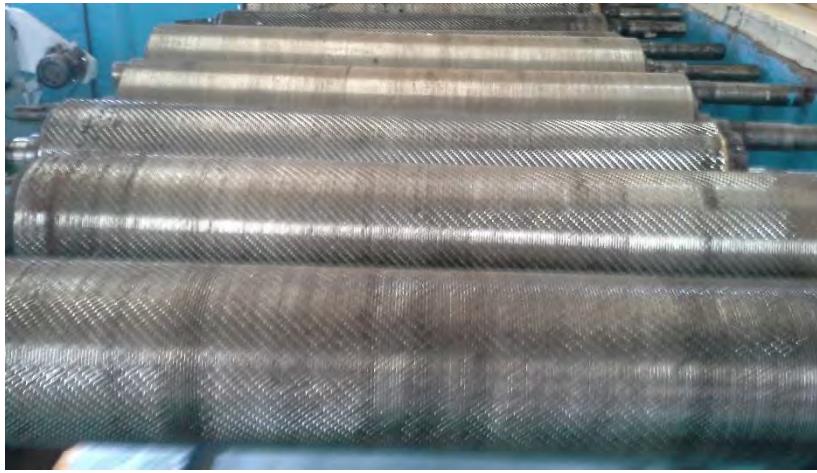
CTC process from field to pack… in less than 24h

TRANSPORT

RECEPTION

WITHERING

ROTOVANE



CTC

OXIDATION (about 2h)

DRYING

FIBRE EXTRACTION

And finally grading to sort the quality leaves

SIEVING

GRADING

QUALITY CTRL

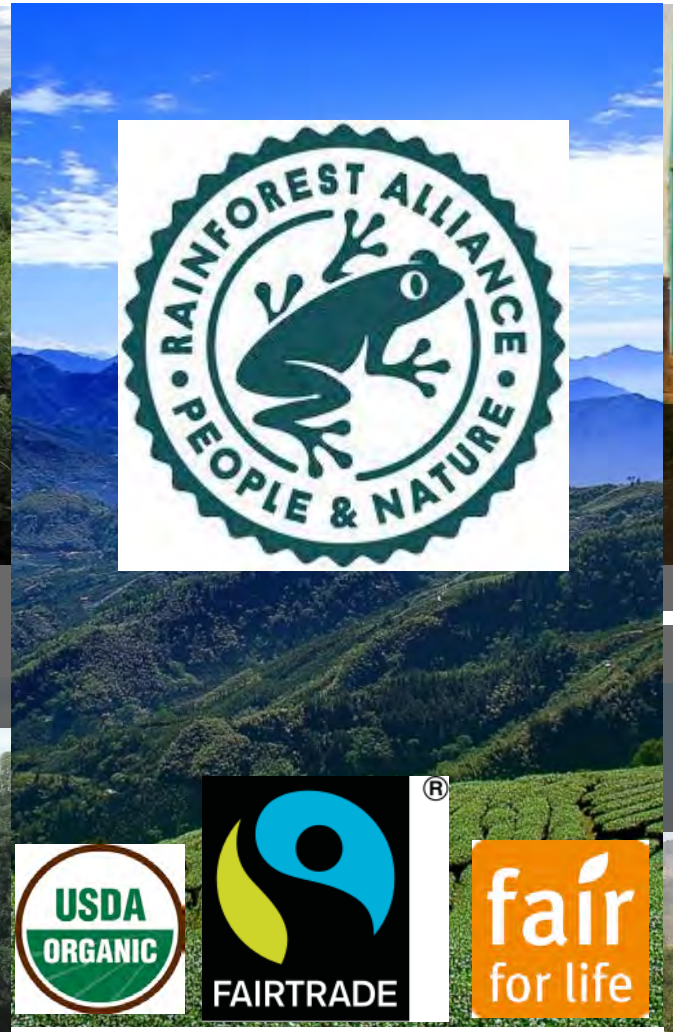
CUPPING

DISPATCHING

Once made the Tea samples are lined up for auction. Thousands of cups are tasted and graded before each auction by tea tasters through a steamy and hectic ritual of slurping and spitting so that they may instruct the auctioneers and select the best.

Sustainability in Tea

Economic Focus
Providing jobs and paying a premium price for tea



Social Focus
Providing workers & families with housing, medical care, clean water

Environmental Focus
Conserving Biodiversity, Protecting soils and waterways

Rainforest Alliance

>700K estates
>2.7Mio acres
>99 evaluation criteria

RA COVERS ALL THREE SUSTAINABILITY PILLARS

ENVIRONMENTAL PROTECTION

SOCIAL EQUITY

ECONOMIC VIABILITY

EMERGING TRENDS IN TEA

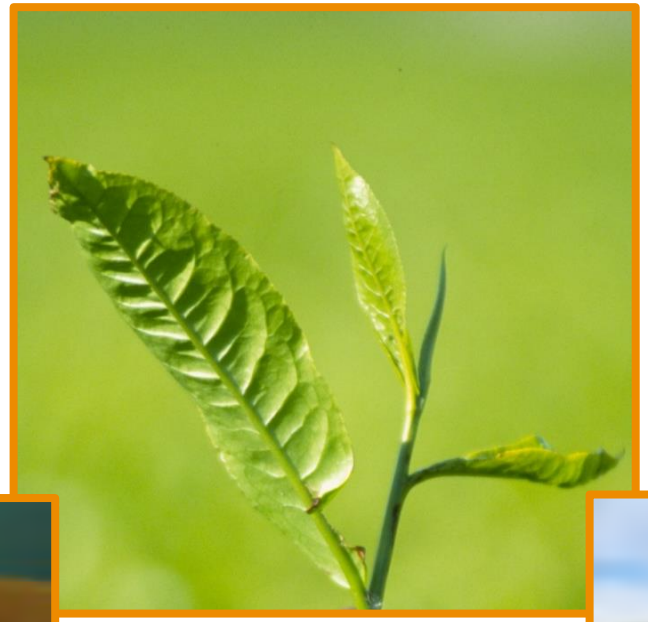
Organic
Cold Brew
Matcha
New unconventional origins: Australia, U.S., Colombia, etc
Health-led benefits
Cheese teas/ Boba /Lattes at home café experience
New cultivars: Purple tea
Cult teas: Pu-her, HeiCha, Kukicha, Hojicha
Tea and food: food pairings, cooking with tea

Tea - Health and Nutrition

TEA FACTS

Most Widely Consumed Beverage
in The World Next to Water

60 Billion Servings of Tea,
Over 2.8 Billion Gallons



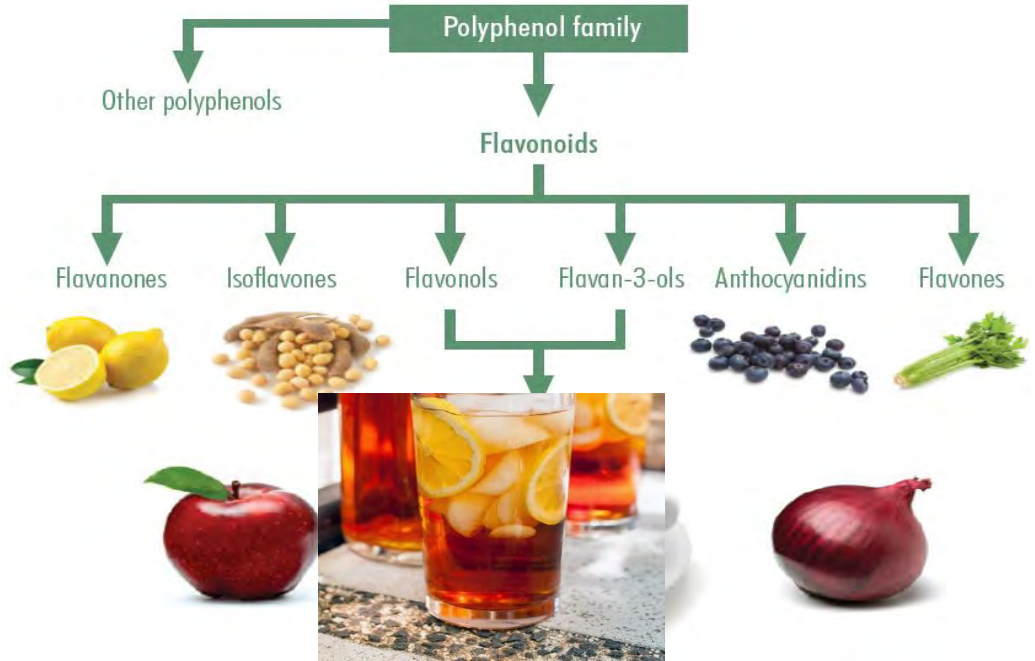
Naturally contains:

- **Caffeine** *(28 -47mg/8 oz) - USDA*
- **Theanine** *(20mg/8 oz)*
- **Flavonoids** *(levels vary)*

FLAVONOIDS

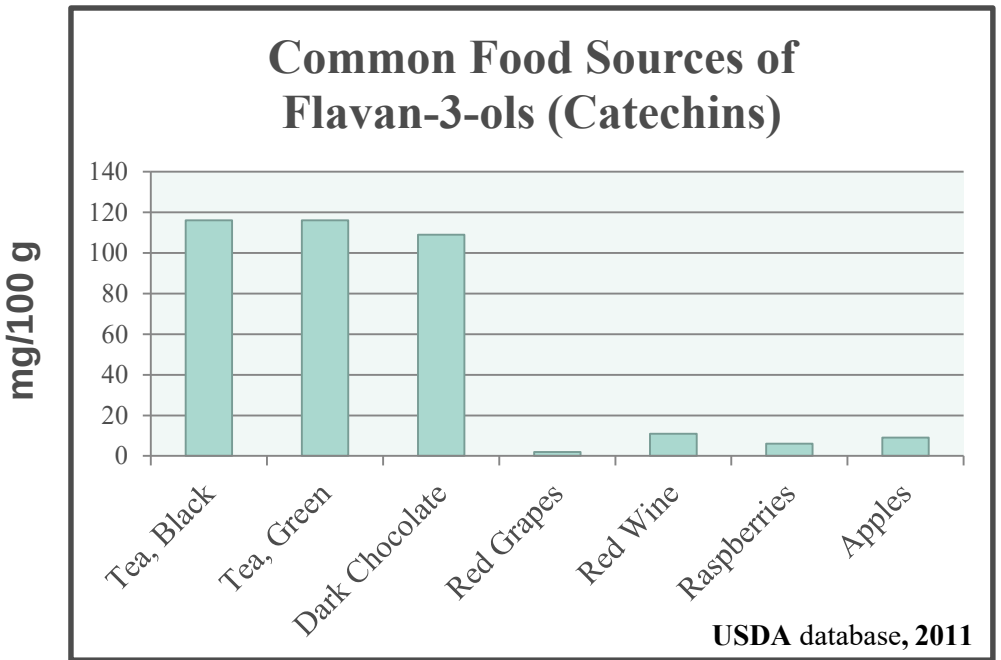
What are Flavonoids?

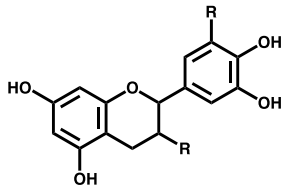
- Naturally occurring polyphenolic compounds
- Flavonoids refer to a collective term that includes six groups of molecules: flavonols, flavones, flavanones, flavan-3-ols, anthocyanidins, isoflavones
- Flavonoids are present in fruits, vegetables, and certain beverages
- Sources of flavonoids include **tea**, apples, grapes, red wine and cocoa



TEA CONTAINS FLAVONOIDS

- Tea is one of the top sources of flavonoids in the diet
- Flavonoids are responsible for key sensory attributes of tea – color, taste, and astringency
- Flavonoids in tea can be absorbed into the body regardless of whether or not milk is added (up to 25% of milk added)





Flavan-3-ols

CARDIOVASCULAR DISEASE

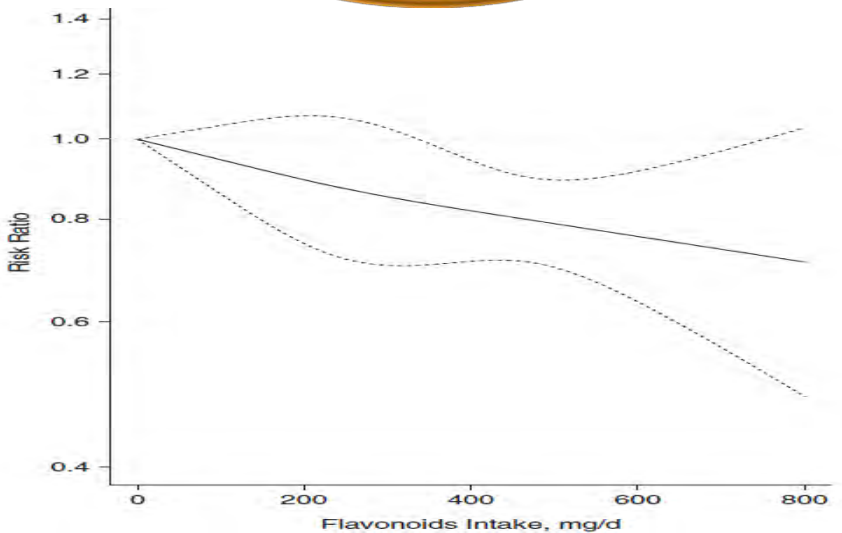
- Refers to a number of conditions:
  - Heart and Blood Vessel Disease (Heart Disease)
    - Heart Attack
    - Stroke

- Prevalence*
  - Heart Disease remains the **No. 1 cause of death** in the U.S.
  - **48% of all adults** in the U.S. have some form of cardiovascular disease
  - Cardiovascular disease, listed as the underlying cause of death, accounts for nearly 837,000 deaths in the US. That's about **1 of every 3 deaths in the U.S.**
  - Direct and indirect costs of total cardiovascular diseases and stroke are estimated to total more than **$329.7 billion**; that includes both health expenditures and lost productivity.
  - **Cardiovascular disease is the leading global cause of death**, accounting for more than 17.9 million deaths per year in 2015, a number that is expected to grow to more than 23.6 million by 2030.

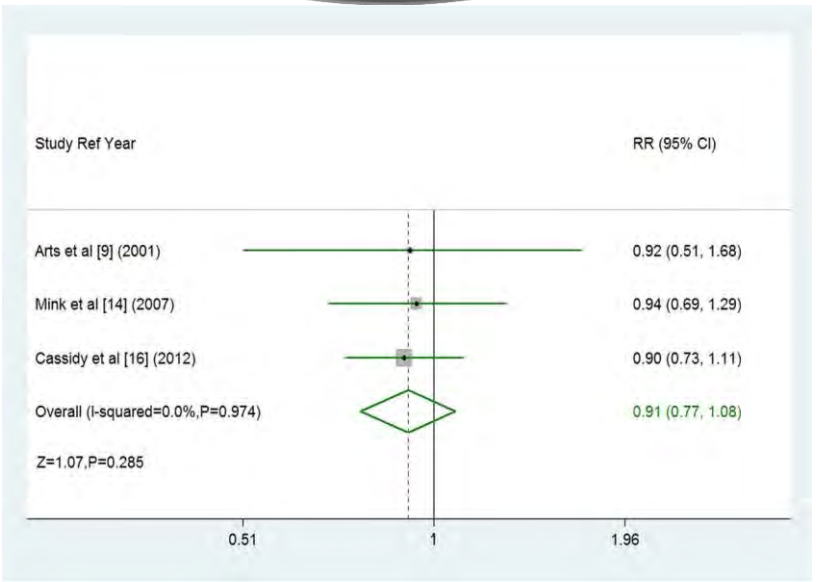
*American Heart Association

INCREASED CONSUMPTION OF FLAVONOIDS FROM ALL DIETARY SOURCES IS ASSOCIATED WITH A LOWER RISK OF CVD

Compared with lower intake, high consumption of total flavonoids was associated with decreased risk of all-cause mortality (RR= 0.74,), while a 100-mg/day increment in intake led to a (linear) decreased risk of 6% and 4% of all-cause and CVD mortality, respectively[1]



Higher dietary flavonoid intake is associated with a significantly reduced risk of stroke.
Dose-response analyses indicated a 9% lower risk of stroke per 100 mg/day increment in flavonoids.[2]



[1]Grosso Am J Epidemiol. 2017;185(12):1304–1316
[2]*Tang Z, et al. BMJ Open (2016) 6:e008680*

CAN HELP SUPPORT A HEALTHY HEART

- A substantial amount of consistent scientific evidence demonstrates an inverse relationship between overall flavonoid consumption and at least one or more cardiovascular endpoints.

- Front of Pack Claim - “Can Help Support a Healthy Heart”

- Back of Pack Claim – Daily consumption of 2-3 cups of unsweetened brewed tea providing between 200-500mg of flavonoids can help support a healthy heart as part of a diet consistent with dietary guidelines.
  - One cup of Lipton brewed green and black tea provide 150 and 170 mg flavonoid, respectively
  - Zero Calories
  - No added sugar
  - Flavonoid content can range among tea products

nutrients

MDPI

Article

Tea Consumption Patterns in Relation to Diet Quality among Children and Adults in the United States: Analyses of NHANES 2011–2016 Data

Florent Vieux [1], Matthieu Maillot [1], Colin D. Rehm [2] and Adam Drewnowski [3,*]

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Received: 25 August 2019; Accepted: 23 October 2019; Published: 3 November 2019

check for updates

Abstract: Flavonoid-rich tea offers an alternative to sugar-sweetened beverages. The present analyses, based on 2 24-hour dietary recalls for 17,506 persons aged ≥9 years old in the 2011–2016 National Health and Nutrition Examination Survey database (NHANES 2011–2016), explored tea consumption patterns in relation to demographics, diet quality, cardiovascular disease (CVD) biomarkers (lipids and blood pressure), and body weight. Beverage categories were unsweetened tea, other tea (herbal and

- **Do unsweetened tea drinkers have healthier diets?**
  - The results indicated the diets of daily consumers of unsweetened tea are significantly **higher in protein, dietary fiber, and select vitamins and minerals, but lower in added sugars and alcohol**.
  - Daily unsweetened tea consumption is associated with **higher good cholesterol (HDL) and lower body mass index (BMI) values (lower body weight)** in adults.
  - Relative to those who do not consume tea, unsweetened tea consumers generally have **healthier beverage choices, including less high calorie sugar sweetened beverages.**

2020-2025 DIETARY GUIDELINES FOR AMERICANS

Dietary Guidelines for Americans
2020 - 2025
Make Every Bite Count With the *Dietary Guidelines*
Ninth Edition • DietaryGuidelines.gov

When choosing beverages in a healthy dietary pattern, both the calories and nutrients they provide are important considerations.

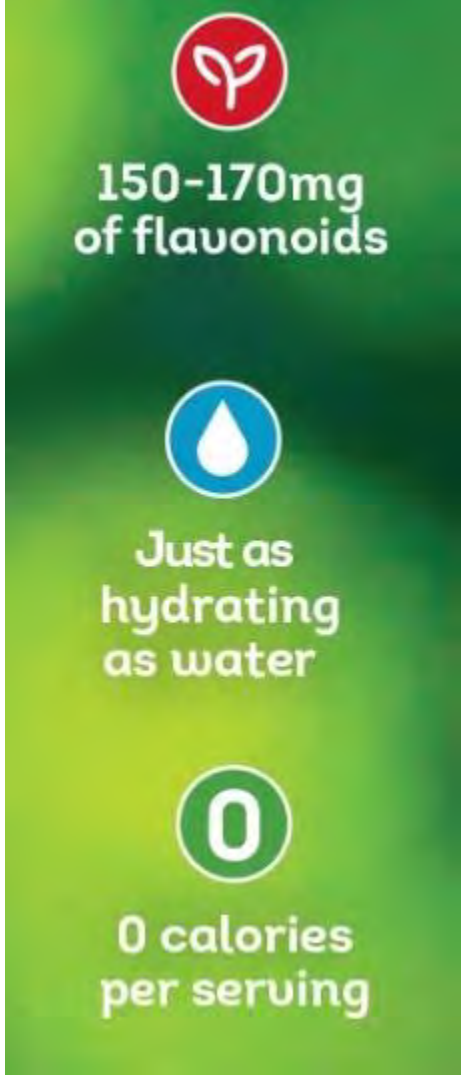
Drink (12-ounce serving)	Total Calories	Added Sugars (Grams)	Added Sugars (Tea-spoons)
Plain Water	0	0	0
Unsweetened Tea	0	0	0
Sports Drinks	97	20	5
Cafe Mocha	290	21	5
Chai Tea Latte	180	23	5 ½
Sweetened Tea	115	29	7
Regular Soda	156	37	9
Lemonade	171	43	10
Fruit Drinks	238	59	14

Data Source: U.S. Department of Agriculture, Agricultural Research Service. 2020. *USDA Food and Nutrient Database for Dietary Studies and USDA Food Patterns Equivalents Database 2017-2018*. Food Surveys Research Group Home Page, **ars.usda.gov/nea/bhnrc/fsrg**.

Typical Burrito Bowl Total Calories = 1,120	Nutrient-Dense Burrito Bowl Total Calories = 715
White rice (1⅓ cups)	Brown rice (1 cup) + Romaine lettuce (½ cup)
Black beans (⅓ cup)	Black beans, reduced sodium (⅓ cup)
Chicken cooked with sauce (2 ounces)	Grilled chicken with spice rub (2 ounces)
No grilled vegetables	Added grilled vegetables (⅓ cup)
Guacamole (½ cup)	Sliced avocado (5 slices)
Jarred salsa (¼ cup)	Fresh salsa/pico de gallo (¼ cup)
Sour cream (¼ cup)	No sour cream
Cheese (⅓ cup)	Reduced-fat cheese (⅓ cup)
Jalapeño (5 slices)	Jalapeño (5 slices)
Iced tea with sugar (16 ounces)	Iced tea, no sugar (16 ounces)

CONCLUSIONS

- Unsweetened tea (green or black, hot or cold) may be considered a primary beverage option as noted in the USDA 2020-2025 Dietary Guidelines for Americans
- Scientific evidence illustrates an inverse linear dose-response relationship between consumption of flavonoids and all-cause and CVD mortality
- Tea is a great option for hydration & can help support a healthy heart



For additional resources – https://www.unileverusa.com/about/nutrition-and-health/


LOVE YOUR
HEART
Drinking unsweetened Lipton Green Tea
can help support a healthy heart‡*
American Heart Association.
Life is Why
CAN HELP SUPPORT A HEALTHY HEART
Lipton
100% NATURAL
GREEN TEA
40 TEA BAGS
0 CALORIES PER TEA BAG
‡The American Heart Association's relationship is limited to unsweetened Lipton Black Tea and Green Tea.
*Unsweetened Lipton Green Tea contains about 150mg of flavonoids per serving, no calories, no added sugars and it is 99.5% water.

THANK YOU

The Cardiovascular Benefits of Black and Green Tea

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Disclosures

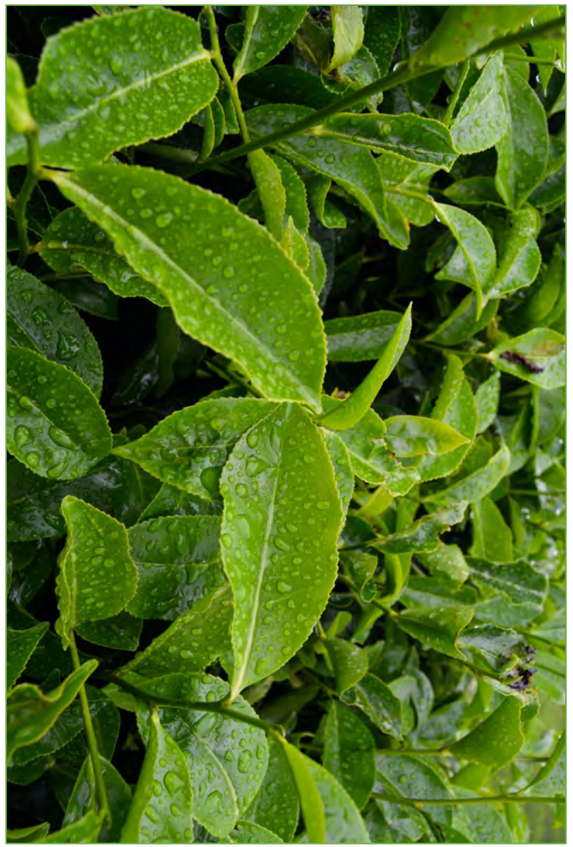
A few conflicts of interest related to the presentation up front:

- Think Healthy Group
- George Mason University
- Journal of Dietary Supplements
- Journal of the American College of Nutrition
- Annals of Medicine
- Research funding from Unilever (owns Lipton®)
- www.drtaylorwallace.com

Tea (*Camellia sinensis*)

A little background on tea:

- Tea is a beverage commonly prepared by pouring hot water over fermented or fresh leaves of the plant *Camellia sinensis*.
- Second most widely consumed beverage in the world, next to water.
- Consumption documented as early as the 3rd century AD in medical texts written by Chinese physician, Hua Tuo.
- The plant is native to East Asia and likely originated in the borderlands of north Burma and southwestern China.



Nutrition Today. 2018;53(5):213.

Medicinal Aspects of Tea

Tea has been used in traditional eastern medicine for centuries

- Tea drinking is popular in traditional Chinese medicine. It is also believed that the people of Sichuan used the brewed tea as a stimulating beverage, rather than a medicinal concoction.
- Tea is a major source of flavonoids in the diet. American tea drinkers have been shown to have ~20 times higher flavonoid intakes compared to those who do not consume tea.

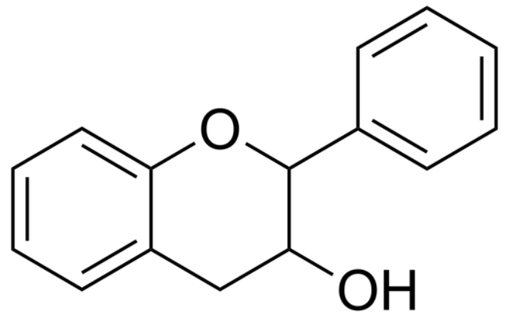
J Nutr. 2008;138(8):1543S.

Flavonoids & Flavan-3-ols

What are flavonoids and flavanols?

- Flavonoids are healthy polyphenolic compounds found in plant-derived foods. There are six groups of flavonoids and each is broken down by the body in a different way: flavonols, flavanols, flavones, flavanones, anthocyanins, and isoflavones.
- Flavanols (also known as flavan-3-ols) in products like tea, cocoa, and cranberry have an abundance research demonstrating their potential heart-health effects.

Structure of a flavanol.



Am J Clin Nutr. 2019;110(5):1067.

Tea Consumption and CVD

What's all the fuss about tea and CVD?

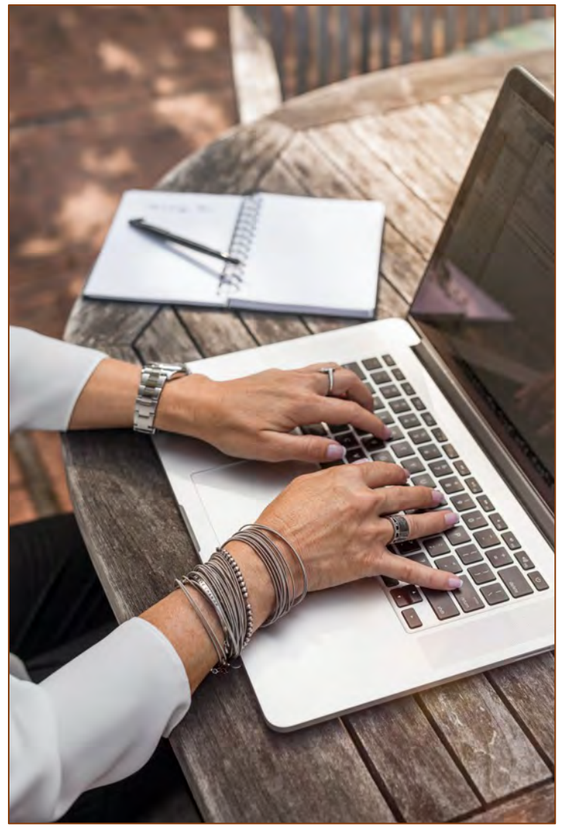
- 48% of adults in the United States have some form of cardiovascular disease (CVD) according to the American Heart Association.
- Consumers describe cardiovascular health as a top desired benefit from food.
- Consumers prefer to be told what to eat vs. what not to eat. Therefore, tea consumption may be a practical means of preventing the onset of CVD, the leading cause of death among Americans.

https://foodinsight.org/wp-content/uploads/2018/05/2018-FHS-Report-FINAL.pdf

Our Research

Systematic reviews of the entire body of research:

- First systematic review assessed the role of tea consumption in relation to all cause mortality, CVD mortality, CVD events (e.g., heart attack), and stroke events.
- Second systematic review assessed the role of tea consumption in relation to blood lipids (i.e., total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglycerides) and blood pressure.
- We used the National Academies of Medicine's standards for conducting systematic reviews.



Finding what works in health care: standards for systematic reviews. National Academies Press; 2011.

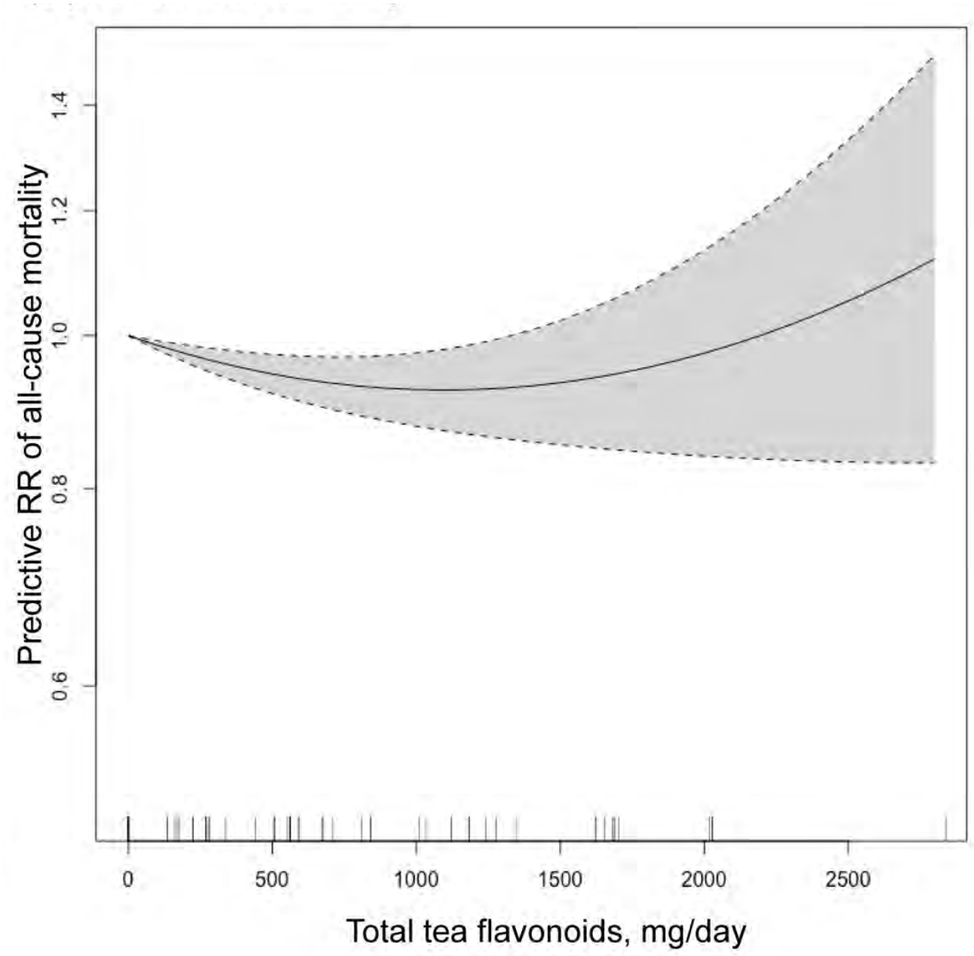
Systematic Review (SR) 1

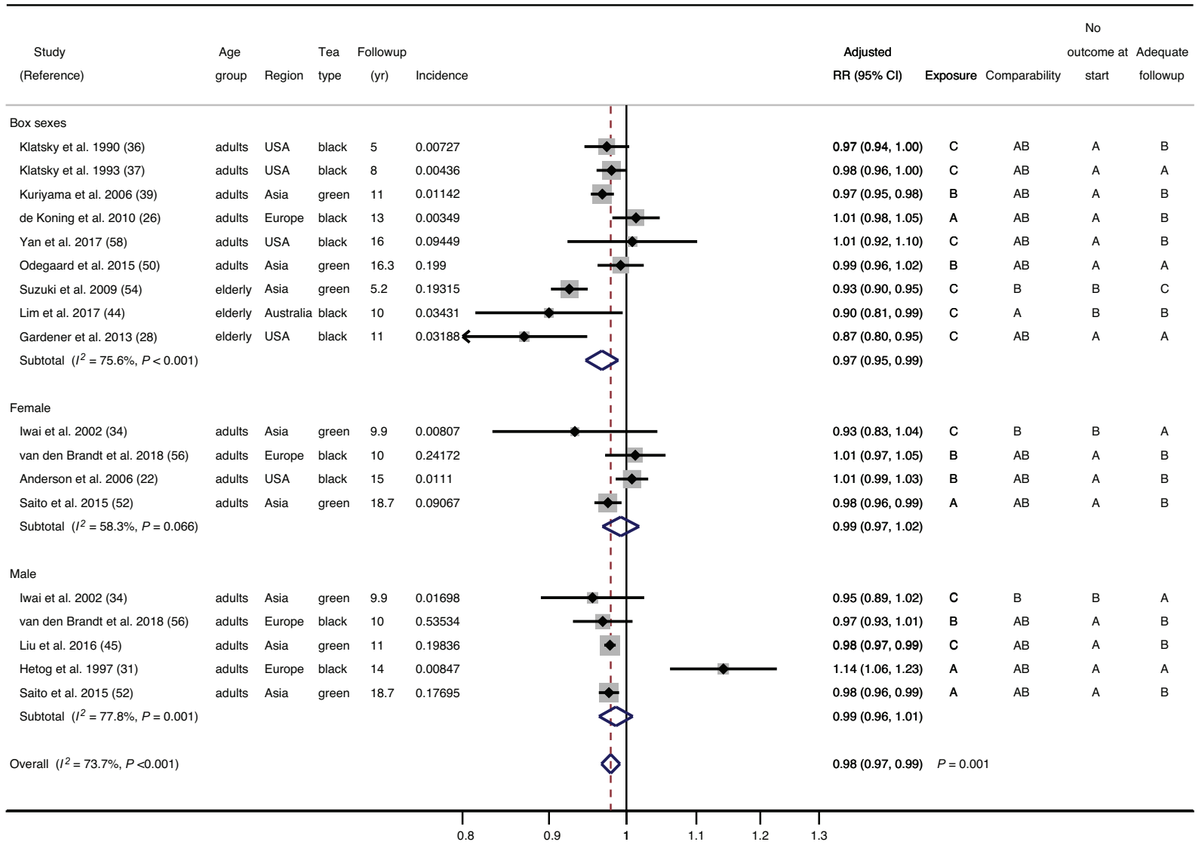
Results:

- 39 prospective cohort studies included in the systematic review: all cause mortality (N=15), CVD mortality (N=19), CVD-events (N=7), and stroke events (N=13).
- Most studies reported multiple outcomes of interest. 8 studies did not report sufficient data to be included in our meta-analyses.
- Each cup of daily tea consumption was associated with an average 1.5% lower risk of all cause mortality, 4% lower risk of CVD mortality, 2% lower risk of CVD events, and 4% lower risk of stoke events.

Adv Nutr. 2020.;11(4): 790.

SR 1 – Results – All Cause Mortality





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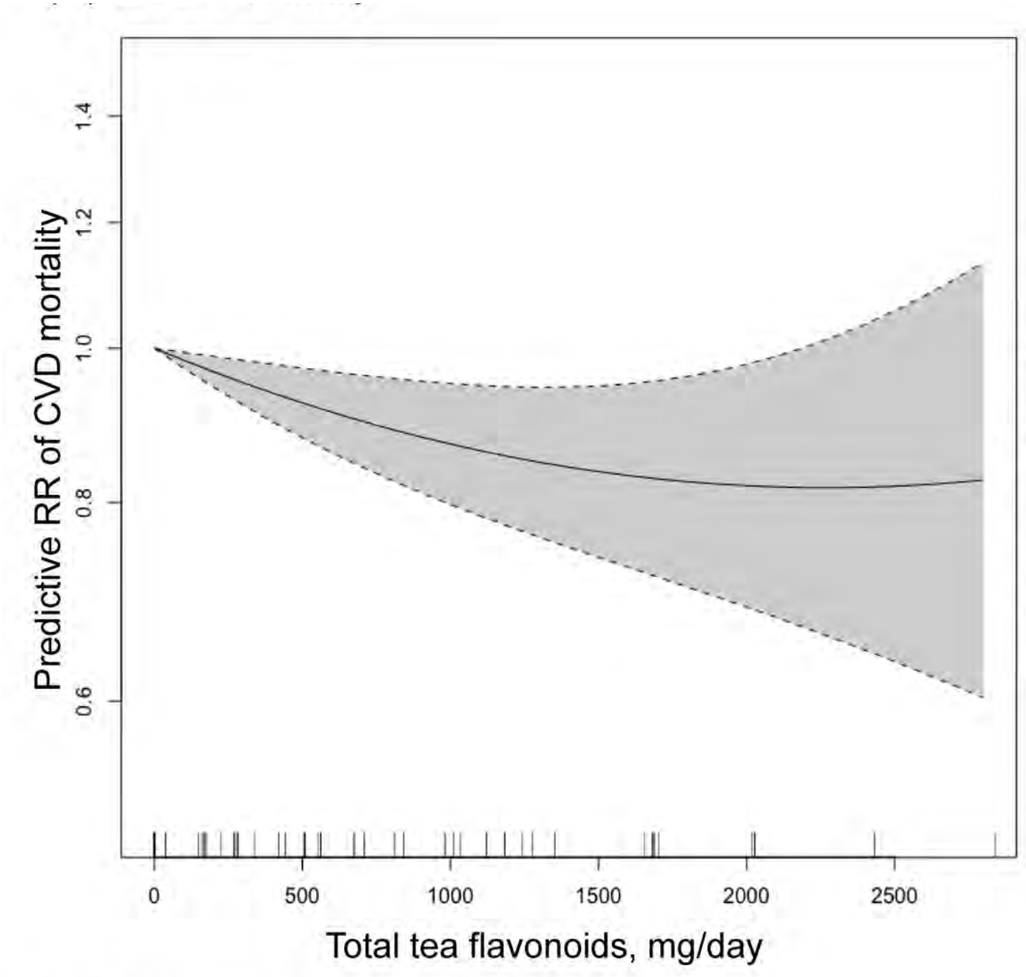
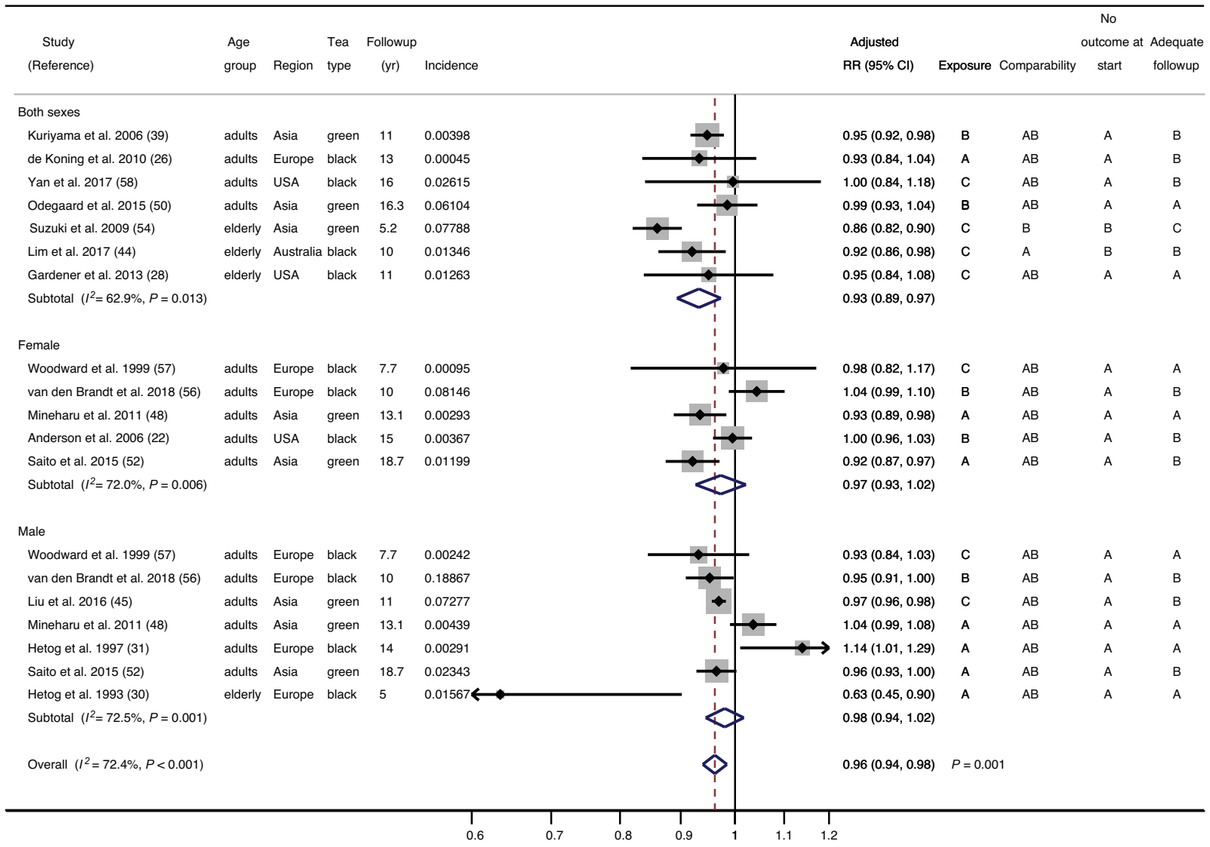
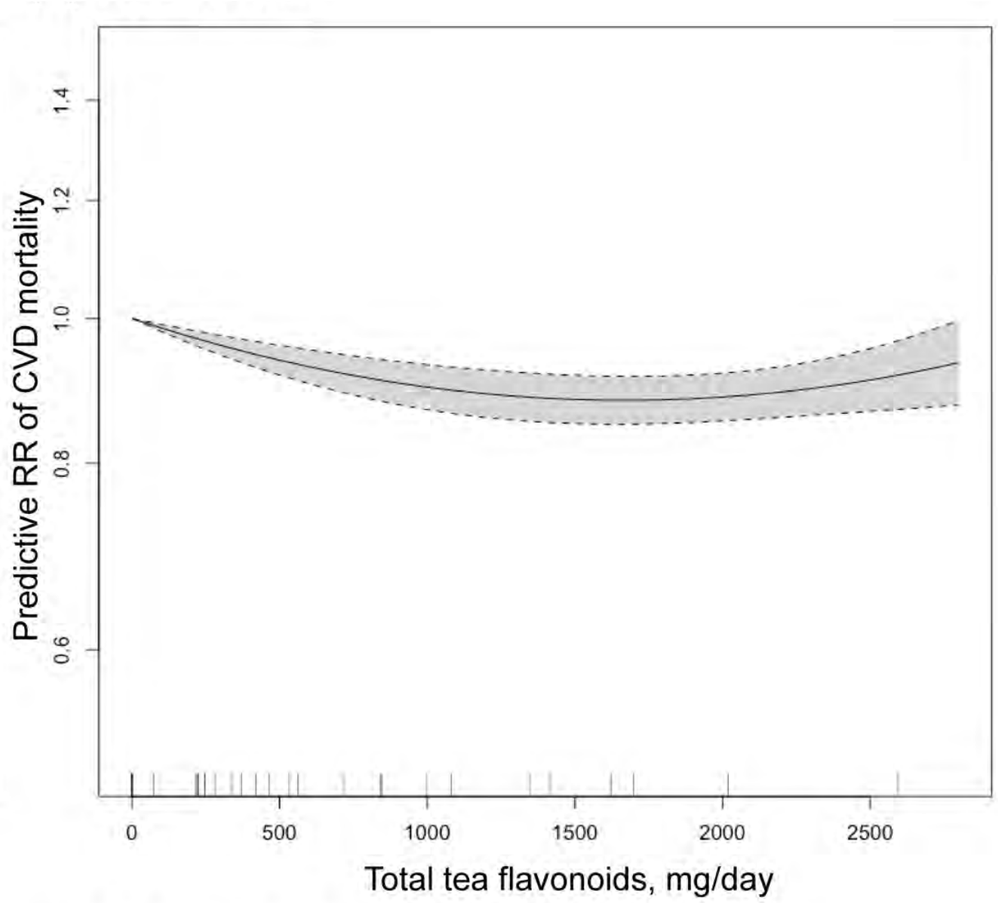
SR 1 – Results – CVD Mortality

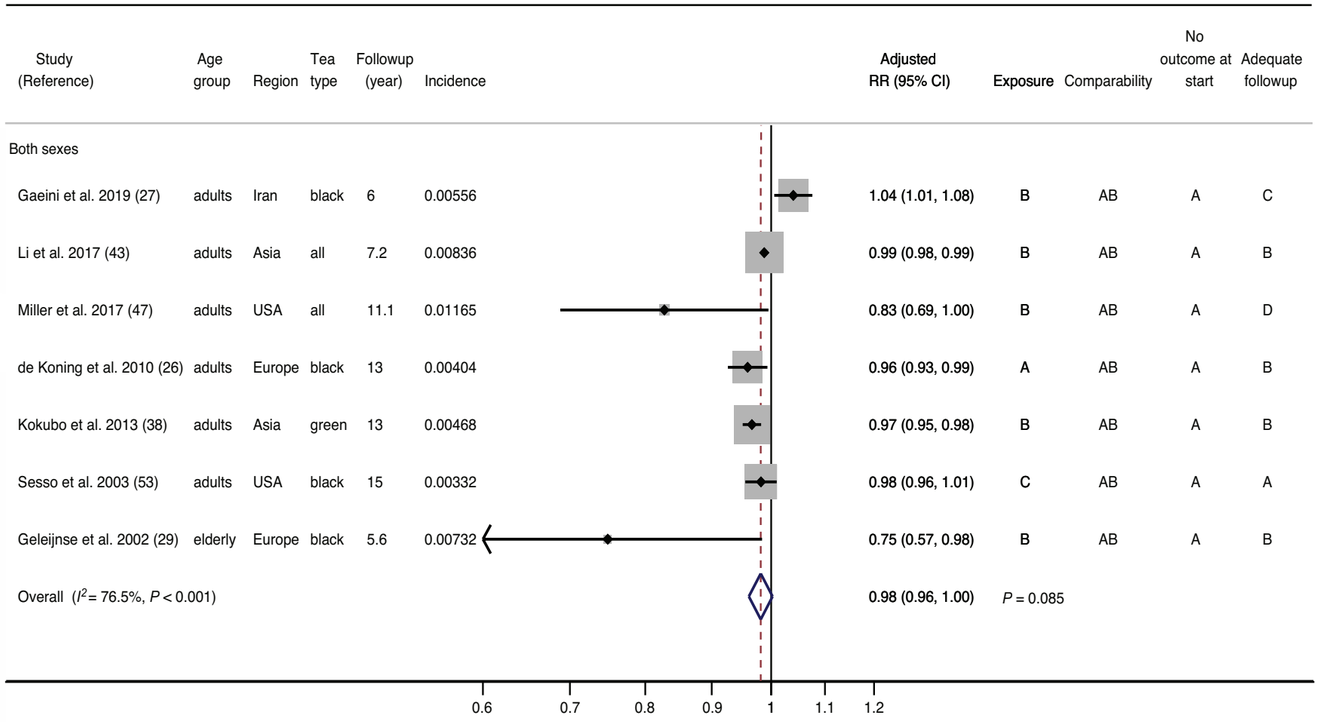




Adv Nutr. 2020.;11(4): 790.

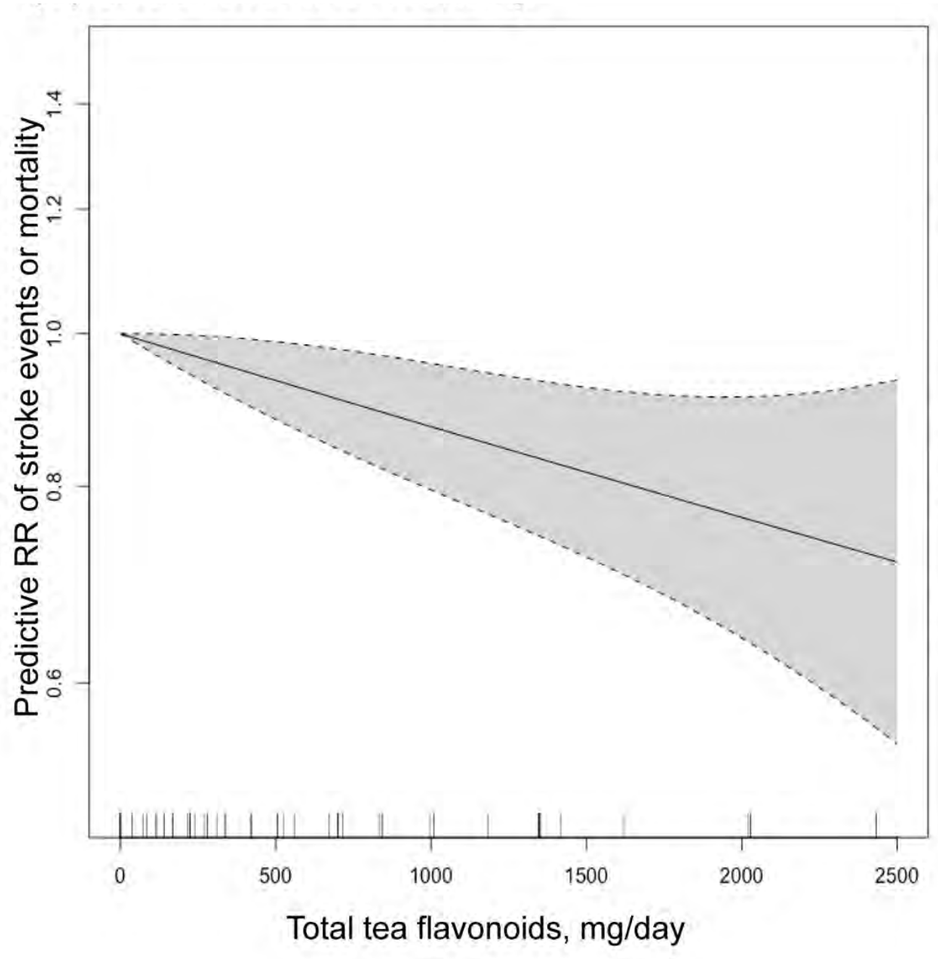
SR 1 – Results – CVD Events

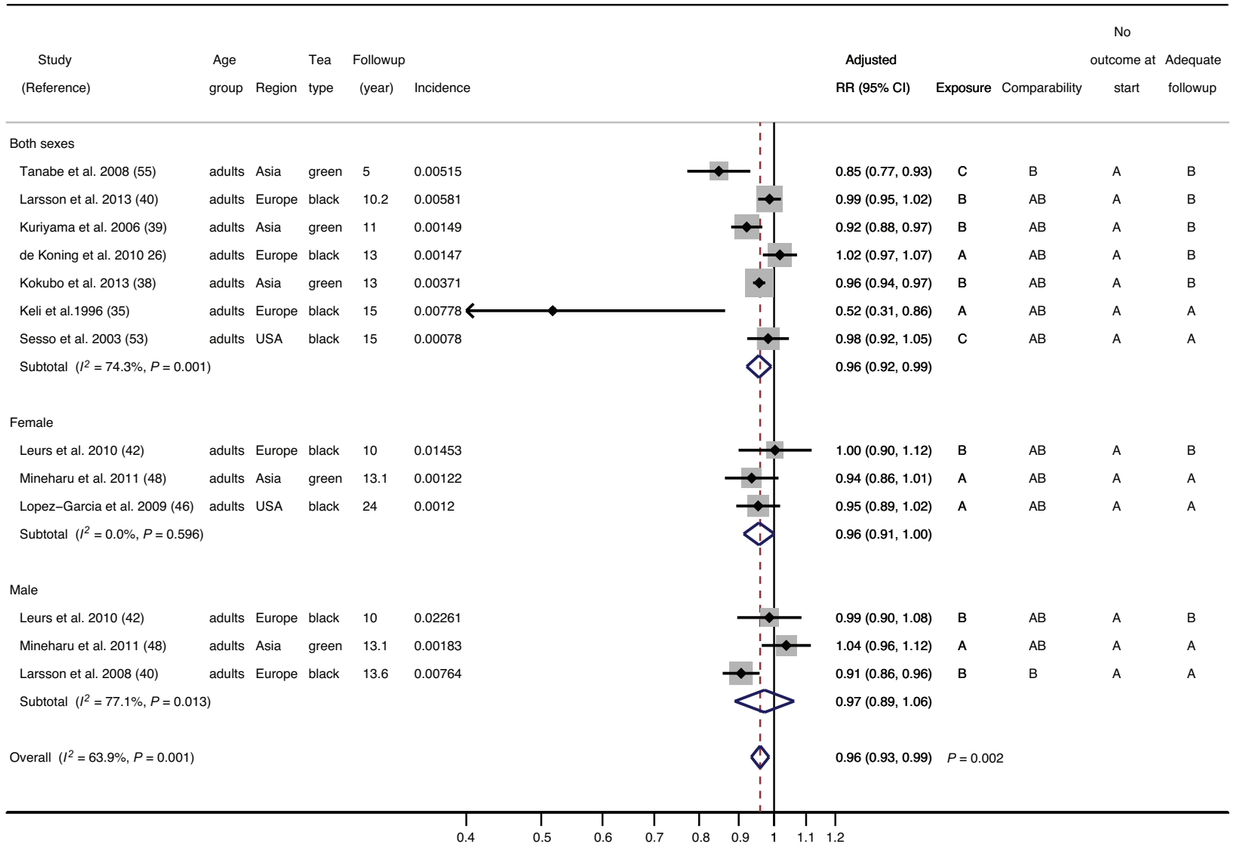




Adv Nutr. 2020.;11(4): 790.

SR 1 – Results – Stroke Events





Adv Nutr. 2020.;11(4): 790.

Systematic Review (SR) 1

Strength of Evidence Grading

- Based on the evidence-to-date.
- Single components of the diet are likely to show only minute effects.
- Dietary patterns (e.g., consuming tea along with a healthy diet rich in fruits, vegetables, whole grains, lean protein, and low/non-fat dairy) show much larger effects.
- Its hard to tease out confounders in observational studies.

Outcome	Strength of Evidence
All Cause Mortality	
Adults	Low
Elderly (≥65)	Low
CVD Mortality	
Adults	Low
Elderly (≥65)	Moderate
CVD Events	Low
Stroke Events	Low

Adv Nutr. 2020.;11(4): 790.

Why Does Tea Decrease Risk of CVD?

Let's talk mechanisms:

Tea may influence multiple biological processes that impact development of CVD, including but not limited to effects on:

- Blood lipids
- Blood pressure
- Endothelial function and improvements in blood flow
- Cross-communicating proteins that regulate inflammation
- Microbiome

J Nutr. 2020.;150: 3269.

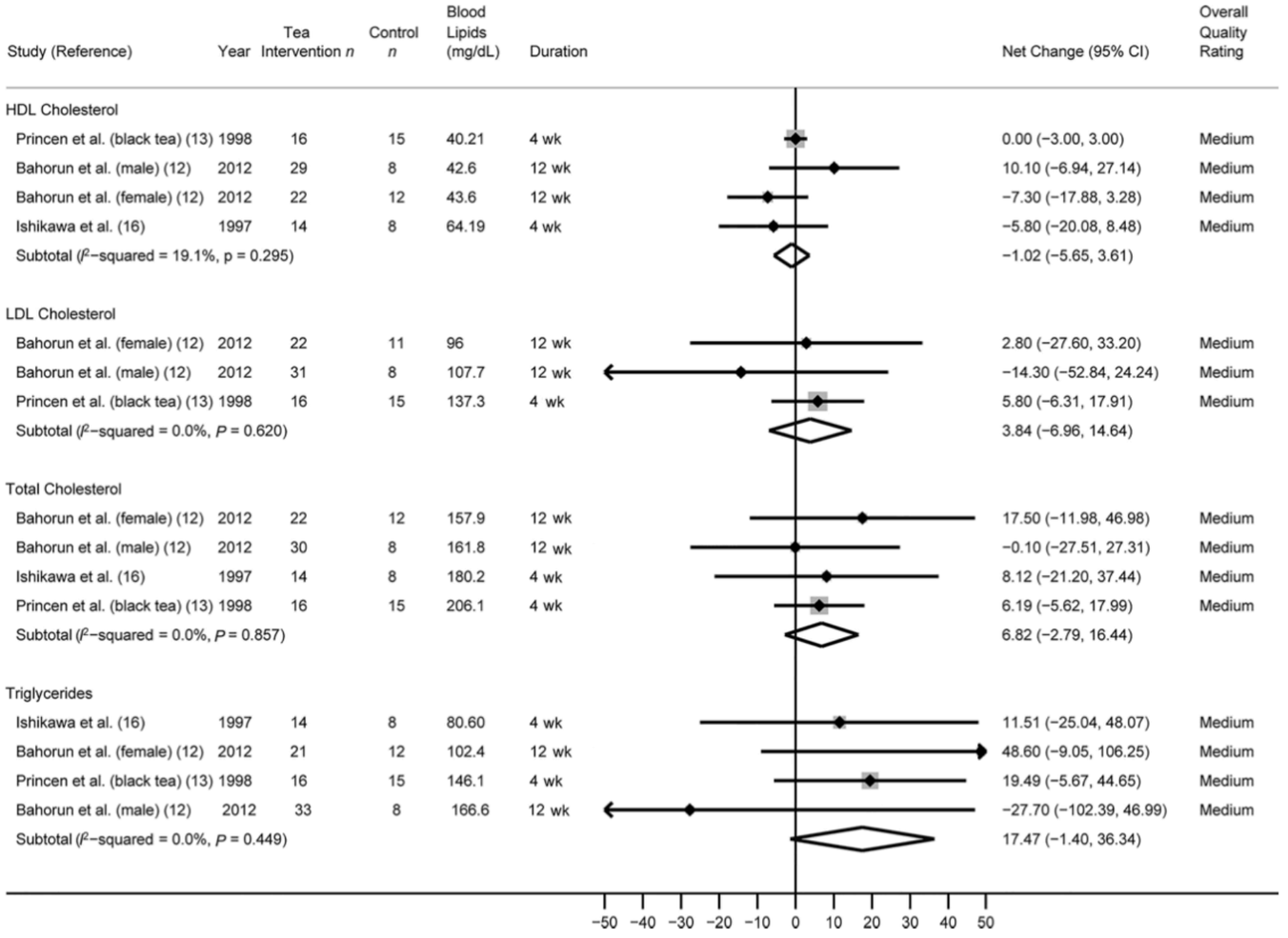
Systematic Review (SR) 2

Results:

- 14 randomized controlled trials included in the systematic review: total cholesterol (N=), LDL-cholesterol (N=), HDL-cholesterol (N=), triglycerides (N=), systolic blood pressure (N=), and diastolic blood pressure (N=).
- Most studies reported multiple outcomes of interest and had insufficient sample sizes and statistical power to to observe changes.
- No significant effects of tea consumption were found on total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, systolic blood pressure, and diastolic blood pressure.

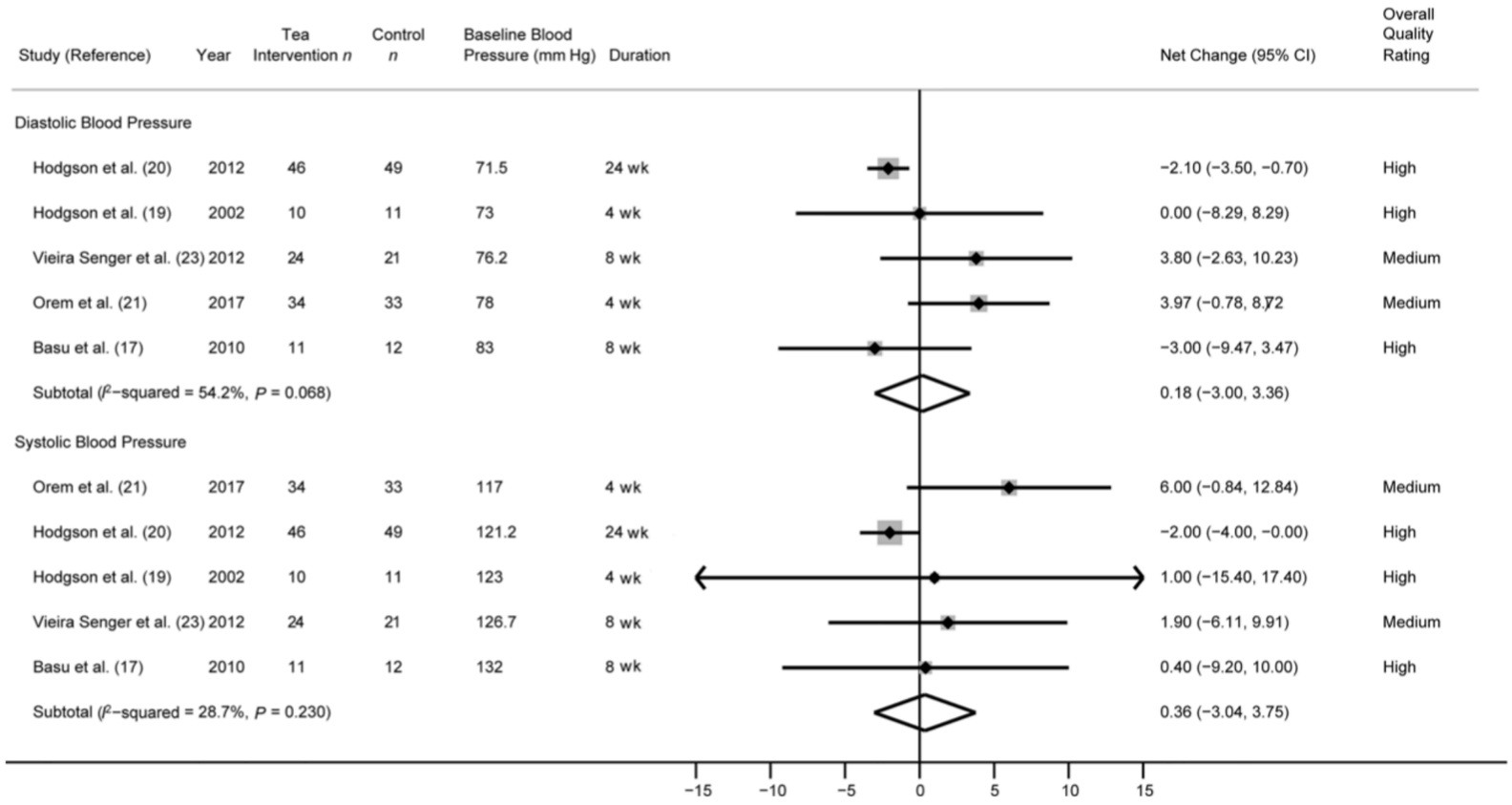
J Nutr. 2020.;150: 3269.

SR 2 – Results – Blood Lipids



J Nutr. 2020.;150: 3269.

SR 2 – Results – Blood Pressure



J Nutr. 2020.;150: 3269.

Endothelial Function & Blood Flow

Dilation of the arteries

- Endothelial cells line the inside of the arteries (known as the endothelium) and produce endothelial nitric oxide (eNOS) in response to flavanols and other healthy dietary components. eNOS dilates the arteries and helps to promote healthy blood flow. This is biological process is termed “flow-mediated dilation” or FMD.
- Tea consumption has been shown in a recent systematic review to improve FMD by about 2.6%. Just a 1% change in FMD has been shown to reduce the risk of CVD by ~10%

Int J Cardiol. 2013;168:344.

Inflammation

Regulation of cross-communicating proteins.

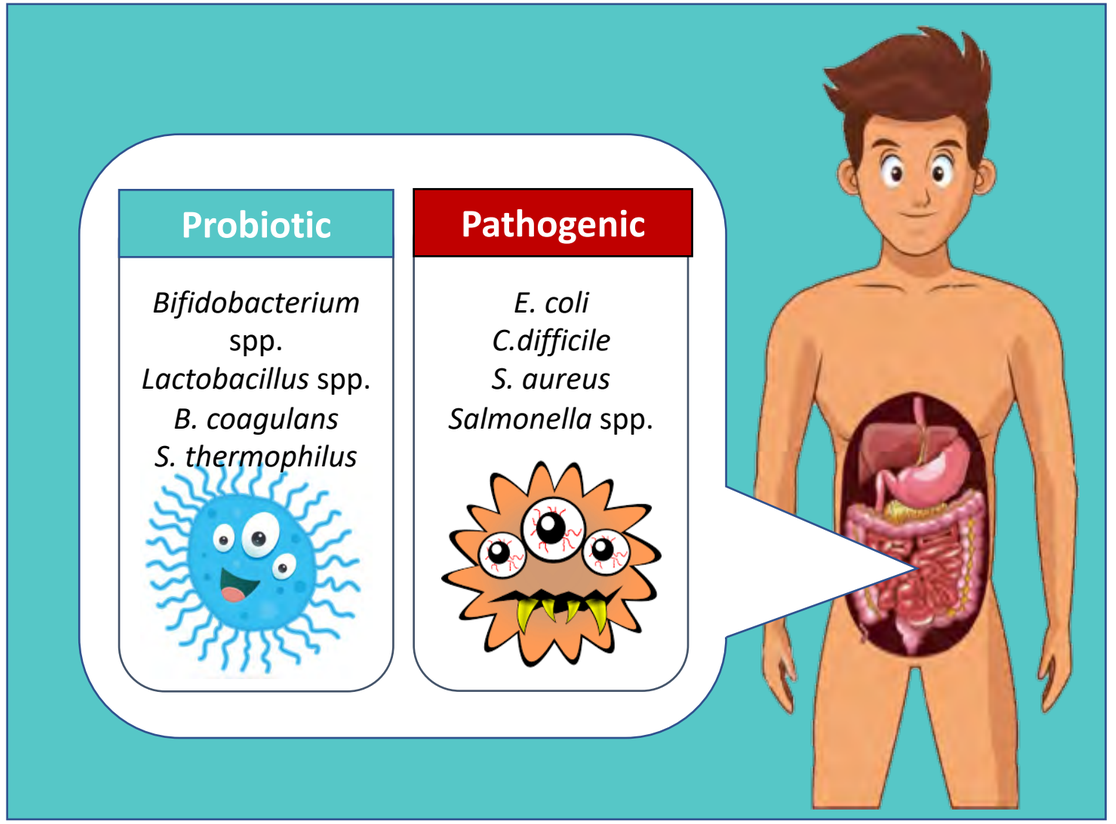
- Inflammation refers to the body's process of fighting things off that harm it. When something damages your cells, cross-communicating proteins trigger a response from the immune system. Flavonoids are known to positively influence CVD risk by acting on these cross-communicating proteins that regulate the anti-inflammatory Nrf2 and proinflammatory nuclear factor-Kβ (NF-Kβ) pathways.

Compr Rev Food Sci Food Saf. 2018;17:1054.

Effects On The Microbiome

Colonic microbes convert flavanols…

- The microbiome is known to metabolize flavanols efficiently into small-molecular weight compounds that exert biological effects in relation to CVD and overall health.
- At the same time, a diet rich in foods containing flavonoids has been shown to promote the growth of probiotic bacteria.



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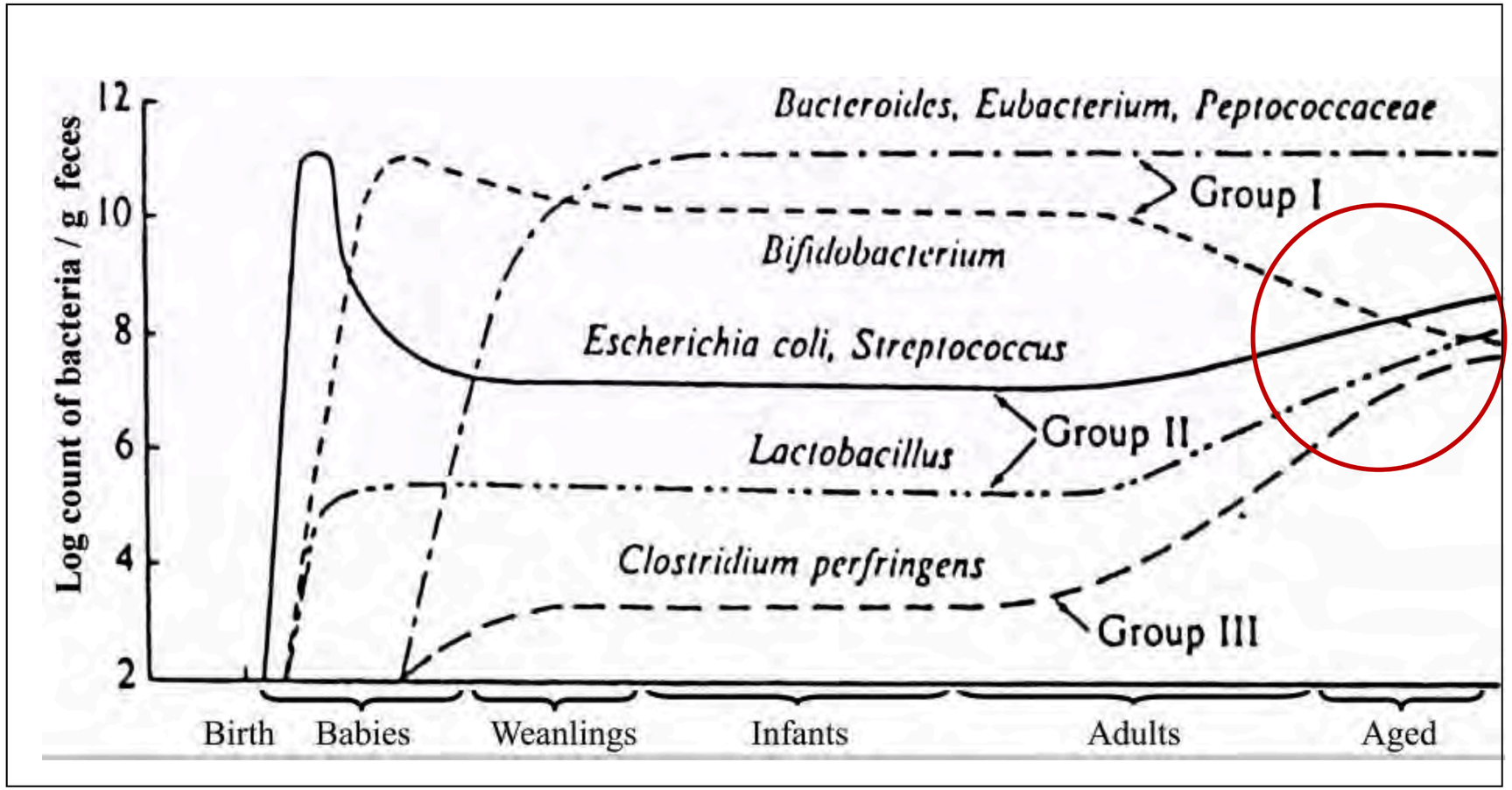
Effects On The Microbiome



Biosci Microbiota Food Health. 2014;33(3):99.

Conclusion

Conclusion:

- Unsweet tea consumption seems to decrease the incidence of CVD-related mortality and events, but the biological mechanisms are likely multifactorial and still under investigation.

J. Nutr. 2020.;150: 3269.

Thank You!

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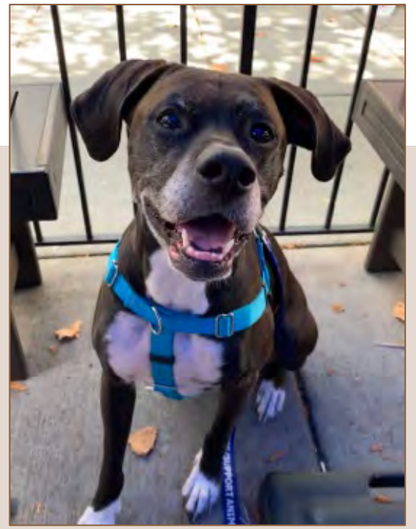

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