Tea Fact Sheet – 2019-2020

Tea is the most widely consumed beverage in the world next to water, and can be found in almost 80% of all U.S. households. It is the only beverage commonly served hot or iced, anytime, anywhere, for any occasion. On any given day, over 159 million Americans are drinking tea.

Annual Consumption: **(U.S.)**	In 2019, Americans consumed over 84 billion servings of tea, or more than 3.8 billion gallons. About 84% of all tea consumed was black tea, 15% was green Tea, and the small remaining amount was oolong, white and dark tea. Year-on-year, imports are slightly lower and green tea has increased its percentage of total imports vs. 2018. The U.S. continues as the third largest importer of tea in the world after Russia and Pakistan, and literally the only western country to grow in both tea imports and consumption. Approximately four in five consumers drink tea, with Millennials being the most likely (87% of millennials drink tea).
Daily Consumption: **(U.S.)**	On any given day, more than one half of the American population drinks tea. On a regional basis, the South and Northeast have the greatest concentration of tea drinkers.
Iced Tea Consumption:	Approximately 75 - 80% of tea consumed in America is iced.
Ready-To-Drink Iced Teas:	The RTD tea category softened ever so slightly, with tremendous competition from other beverages. Our view is about a 1% decline. The canned/bottled RTD tea segment comprised about 50% of total market share and is expected to assume a more modest growth of 1 – 3% CAGR over the next five years.
Tea Bags, Herbal & Loose Tea:	The bagged/loose leaf tea segment through traditional channels continues to lag, showing a slight decline over 2018. This segment continues to be important in introducing new consumers to tea. Foodservice, refrigerated teas and high-end specialty teas continue to grow at slightly accelerated rates, stealing share from both traditional and RTD with a growth of some 4 – 5% per annum.

Current Sales:	In 2019, total U.S. black and green tea imports were 260 million pounds. This represents a decline vs. 2018 of some 1.1%. The positive news is that dollar values continue to strengthen and the rate of decline has slowed.
	Hot tea and specialty tea continue their growth and appeal to consumers
	Green tea regained some of its 'shine', now representing 15.0% of imports
Anticipated Sales: (U.S.)	The industry anticipates continued growth, with an anticipated CAGR of 1-3%. This growth represents all segments, driven by tea's variety, convenience, health benefits, sustainability, availability, continued innovation and the discovery of unique, flavorful and high-end specialty tea. Long term success relies on the continued adoption of tea by new consumers who continually seek healthy food and beverage choices.
Varieties:	Black, green, oolong, dark and white teas all come from the same plant, a warm-weather evergreen named *Camellia sinensis*. Differences among the five types of tea result from the various degrees of processing and the level of oxidization. Black tea is fully oxidized and oolong teas are partially oxidized. After withering and rolling, the tea leaves undergo natural chemical reactions resulting in taste and color changes which develop the teas distinguishing characteristics. Green & white teas are not oxidized after leaf harvesting. Oolong tea is midway between black and green teas in strength and color. Dark teas are fermented after manufacture.
Grown In:	Much of the world's tea is grown in mountainous areas 3,000 – 7,000 feet above sea level, situated between the Tropics of Cancer and Capricorn in mineral-rich and acidic soil. Over 30 countries grow tea with leading tea-producing countries being Argentina, China, India, Indonesia, Japan, Kenya, Malawi, Sri Lanka, Tanzania, Taiwan and Vietnam.
History:	Tea is nearly 5,000 years old. Purportedly discovered in 2737 BC by Chinese Emperor Shen-Nung, aka "The Divine Healer". As legend tells us, some tea leaves accidentally blew into the Emperor's pot of boiling water and created the first tea brew. According to Chinese tea scholars, the Emperor, as a botanical explorer, accidentally poisoned himself some 85 times, each time being cured by this wonderful brew.
	In the 1600's, tea became highly popular throughout Europe and the American colonies. Tea played a dramatic part in the establishment of the United States of America. In 1767 the

British Government passed the Revenue Act (one of the Townshend Acts) putting a tax on tea, as well as British china, glass, lead, paint and paper, imported to America. In 1770, after much protest, the Townshend Acts were repealed and all taxes removed with the exception of the tax on tea. In 1773, the passage of the Tea Act, granting a monopoly to the British East India Company on all tea sales to the American Colonies, effectively raised tea prices. Protesting this monopoly, which drove tea prices higher, as well as "taxation without representation" re: the tax on tea by Parliament, an incensed group of colonists, the Sons of Liberty, took actions in their own hands. On the night of December 16, 1773, men dressed as Native Americans (Mohawk Indians) boarded British ships in Boston Harbor and threw more than 300 chests of tea into the sea. While not the only instance of tea being thrown overboard or otherwise destroyed in protest throughout the colonies, this most famous Boston Tea Party was said to be a principle act leading to the Revolutionary War.

Anna, Duchess of Bedford, is credited with creating *Afternoon Tea* in 1840, when she began taking tea with a light snack around 4:00 p.m. to ward off "that sinking feeling."

High Tea originated with the rural and working-class British, who would return to their homes at about 6:00 p.m. for a meal of potted meats, fish, cheese, salads, sweets, and a pot of strong tea. The U.S. played a significant role in the history of tea, inventing the tea bag and popularizing iced tea in 1904. Recently, the U.S. has led the rest of the world in marketing convenient ready-to-drink forms of tea in bottles.

Environmental Qualities:	Tea is an all-natural and environmentally sound product from a renewable source. Tea supports sustainability in three ways: ecological, social and economic. Hundreds of thousands of workers are involved with the growing, production and manufacturing of the tea that you consume every day. The tea plant is naturally resistant to most insects; oxidation of the tea leaf is a natural process; and, many tea packers use recycled paper for packaging.
Health Qualities:	Tea is a refreshing beverage that contains no sodium, fat, carbonation, or sugar. It is virtually calorie-free. Tea helps maintain proper fluid balance and may contribute to overall good health.

Tea contains flavonoids, naturally occurring compounds that are believed to have antioxidant properties. Tea flavonoids often provide bioactive compounds that help to neutralize free radicals, which scientists believe, over time, damage elements

in the body, such as genetic material and lipids, and contribute to chronic disease.

Every day, new findings from the international scientific community lend credibility to tea's healthy properties. Recent research has explored the potential health attributes of tea through studies in humans, animal models and through *in vitro* laboratory research. For the most part, studies conducted on green and black tea, which are both from the *Camellia sinensis* plant, have yielded similar results. Recent research suggests that tea and tea flavonoids may play important roles in various areas of health and may operate through several different mechanisms still being explored.

Research continues, and the list of key areas of research are as follows:

<u>Heart Health:</u>
Human population studies have found that people who regularly consume three or more cups of black tea per day have a reduced risk of heart disease and stroke.[1-5] A 2020 review found adults who drink 2-3 8 oz. cups of tea per day may lower their risk of death from heart disease by approximately 8-12% and may lower their risk of all-cause mortality by approximately 4-6%, compared to nonconsumers.[6] Each 8 oz. cup of tea consumed by those over 65 years old was associated with a 10% lower risk of death from heart disease.[6] The current body of research suggests that drinking tea can offer significant heart health benefits including reducing the incidence of cardiovascular events, slowing the progression of disease, lowering Low Density Lipoprotein (LDL) cholesterol, or "bad" cholesterol, and improving blood pressure – with benefits seen with just one cup and upwards of six cups a day. Using survey data from Multi-Ethnic Study of Atherosclerosis, a 2016 investigation found that those who drank more than one cup of tea per day had a lower incidence of cardiovascular events and a slower progression of coronary artery calcification.[7] This result is supported by other cohorts.[8,9] For example, data from the Dongfeng-Tongji cohort, found that of the 19,471 middle-aged and older Chinese individuals who drank green tea (~36% of participants) had a reduced risk of coronary heart disease (CHD). After 5-year follow-up there were significantly lower levels of total cholesterol, LDL, and mean platelet volume and increased HDL and uric acid levels among green tea consumers.[8,9]

A Harvard study found that those who drank a cup or more of Black tea per day had a 44% reduced risk of heart attack.[10] In a large population-based study published in the *Journal of the American Medical Association*, found that adults who drank just

over two cups of Green tea per day reduced their risk of death from cardiovascular disease by 22-23%.[11] A U.S. Department of Agriculture study found that participants who consumed five cups of Black tea per day along with a diet moderately low in fat and cholesterol reduced their LDL cholesterol by about 11% after three weeks.[12] Additionally, a study published in the December 2013 issue of the *American Journal of Clinical Nutrition* found that Black tea reduced blood pressure, and among hypertensive subjects, it helped counteract the negative effects of a high-fat meal on blood pressure and arterial blood flow.[13]

Certain Cancers:
More than 3,000 published research studies have evaluated the effect of tea—White, Green, Oolong or Black—and tea compounds, such as epigallocatechin gallate (EGCG), on the risk of a variety of cancer types. A study published in the February 2015 issue of the Journal of *Molecular Nutrition and Food Research* found that the main antioxidant in Green tea, epigallocatechin-3-gallate (EGCG), helps kill cancer cells through the destruction of the cells' mitochondria.[14] Research has also identified an association between amount and duration of tea consumption and gastrointestinal cancer risk. One study found that women who consumed the equivalent of 2.5 cups of tea per day had a 60% reduction in rectal cancer risk, compared with women who drank less than 1.2 cups of tea daily.[15] Another study found tea drinkers to have a 42% reduced risk for colon cancer compared to non-tea drinkers. Men who drank more than 1.5 cups of tea per day were found to have a 70% lower colon cancer risk.[16] An animal study suggests that 500 mg/kg/day of Niaowangzhong Green tea extract may be chemo preventive for digestive and intestine cancers.[17]

Tea consumption has been linked to lower skin cancer risk. One study showed that participants who drank iced Black tea and citrus peel had a 42% reduced risk of skin cancer and hot Black tea consumption was associated with a significantly lower risk of the most common form of skin cancer, squamous cell carcinoma. [18,19] More recently, Green tea polyphenols have been suggested as a chemo protective or chemotherapeutic option in skin cancer. A recent review paper of in vitro, in vivo and human studies highlights the various mechanisms by which consumption of Green tea and topical application may have preventative effect against skin cancer. EGCG, along with other polyphenols, act by increasing DNA repair mechanisms, reducing UVB mediated inflammation and oxidative stress and down regulating pathways involved in carcinogenesis. Green tea polyphenols EGCG may also suppress the action of p53, which is involved in tumor suppression. Studies have shown

that the topical application, as well as dietary supplementation of Green or white tea extracts may protect the skin from UV damage by increasing DNA repair. Last, epigenetic modification is caused by UVB exposure, research shows that EGCG may reduce tumor incidence and decrease tumor multiplicity and size.[20]

Scientists suggest that EGCG, in addition to its antioxidant and anti-inflammatory properties, may act at various points in the cell cycle and control apoptosis.[21-23] Using bioinformatics, researchers Xinqiang et al analyzed the targets of epigallocatechin-3-gallate (EGCG) on human genes through an Ingenuity Pathway Analysis which suggests that EGCG acts on several genes involved in the cell cycle, cell growth and proliferation, cell survival and death and DNA replication in ovarian cancer.[21] A recent review of *in vivo, in vitro* and clinical trials by Rahmani et al demonstrated that Green tea may suppress tumor growth. Notably, the clinical trials reviewed indicated that green tea may specifically slow prostate cancer progression.[22] EGCG was shown to have an anti-carcinogenic effect on cervical cancer. This review illustrated that EGCG may modify several critical processes in the cell cycle as well as induce cervical cancer cell apoptosis and inhibit telomerase activity.[23]

Neurological Decline:
Research has identified several modifiable factors that may help slow the progression or reduce the risk of age-related neurological declines and diseases.[24,25] Tea may be one of the modifiable factors as the antioxidants in tea may protect brain cells from environmental insults from free radical exposure. [26-28] In addition, L-theanine in tea has been shown to directly affect areas of the brain that control attention and ability to solve complex problems. [29-31] A study of The Ohsaki Cohort suggested that Green tea consumption (of 5 cups of tea daily vs. 1 cup) was associated with lower risk of incident dementia or new diagnosis of dementia.[32] A long-term study of nearly 30,000 adults found that drinking three or more cups of tea per day led to a 69% reduced risk of developing Parkinson's disease.[33] According to research presented at the 2007 Scientific Symposium on Tea and Health, theanine, an amino acid that is for the most part uniquely found in tea (Green and Black), may help prevent age-related memory decline. This human-based data is supported by data from animal models.[34]

Newer investigations are evaluating the role of EGCG in neurological health. EGCG was found to decrease the expression of inflammatory proteins-tumor necrosis factor α,

interleukin 1β and interleukin 6 and nitric oxide synthase. EGCG was also found to increase levels of intracellular antioxidants, which inhibited reactive oxygen species and had a protective effect on neuronal cells. This evidence suggests that EGCG may be therapeutic option to help attenuate amyloid-β induced neurological decline.[36]

The role of tea in Alzheimer's disease has also shown positive potential.[35] A review authored by Molino, et al., analyzed the neuroprotective effects of tea catechins. The benefit of tea catechins may stem from their antioxidant activity, interaction with cell signaling pathways and anti-inflammatory effects. In addition, the Green tea catechins may be effective in iron chelation which suppresses the translation of amyloid precursor protein and is linked to Alzheimer's disease.[37] A recent animal study on the effect of EGCG on the Nrf2 pathway demonstrates that EGCG may have the ability to increase protein clearance to attenuate Alzheimer's Disease progression, especially early on in disease diagnosis.[38]

Beyond neurocognitive decline, tea has been shown to have several other benefits on the brain. Research has shown that lower contributors of caffeine equal to 1-2 cups of tea daily may benefit cognitive function and sports performance based on adult studies.[39] A 2017 review indicates that tea consumption may be related to reduction in anxiety, benefits in memory and attention and brain function.[40]

Factors Related to Diabetes:
In a randomized control trial of 30 subjects, Mahmoud et al found that 3 cups of Black tea consumption resulted in lowered hemoglobin A1C, decreased expression of tumor necrosis factor-α and increased expression of anti-inflammatory cytokines, which may reduce oxidative stress. This suggests Black tea may have a positive effect on long-term diabetes management.[41] In an animal study, obese rats given Green tea polyphenols were found to have lower levels of hyperlipidemia, body fat synthesis, body weight and fat deposits, compared to the control group. Rats given the treatment also had AMPK activation which resulted in greater insulin sensitivity, reduced de novo lipogenesis and decreased liver fat content.[42] A recent review found higher habitual intakes of flavan-3-ol monomers, like those found in tea, were associated with a reduction in risk of T2DM (10%) and stroke (18%); and these data were calculated to be of moderate strength.[43]

Weight Management:
Several studies suggest drinking calorie-free tea may help with weight management.[44-56] Preliminary research suggested that tea flavonoids help elevate metabolic rate, increase fat

oxidation and improve insulin activity.[44,47,49,54-57] Tea catechins can also provide modest shifts in metabolism that may improve weight loss and maintenance.[44,49,55,56] In one review, researchers concluded that subjects consuming Green tea and caffeine lost an average of 2.9 pounds within 12 weeks while adhering to their regular diet. The results of another meta-analysis suggest the increase in caloric expenditure is equal to about 100 calories over a 24-hour period. The weight loss benefits of tea vary based on many factors, but studies have found benefits with the equivalent of as little as 2.5 cups of Green tea.[57] Using data from the Polish *Health, Alcohol and Psychosocial Factors In Eastern Europe (HAPIEE)* cohort study, tea consumers who drank more than 3 cups daily, had a lower BMI and waist circumference.[58] A recent analysis also found tea consumption was associated with lower body mass index (BMI) values.[59]

Tea and Bone Health:
A recently published meta-analysis analyzed the potential link between tea consumption and bone mineral density (BMD). Across the studies there was a significant increase in BMD for tea drinkers verses non-drinkers.[60] A second meta-analysis verified this relationship – 0.62 odds ratio was calculated from 17 studies indicating that higher tea consumption was associated with a lower risk of osteoporosis.[61] A cross-sectional study of Chinese women over the age of 40 from the Guangzhou Nutrition and Health Study found that tea drinking was significantly and independently associated with higher BMD.[62] Compared to non-tea drinkers, tea drinkers have been found to have a higher BMD.[63] Another trial linked tea consumption with a 30 percent reduction in the risk for hip fractures among men and women 50 years of age or older.[64] Although high caffeine intake has been implicated as a risk factor for reduced bone mineral density (BMD), drinking tea is associated with higher bone mineral density (BMD) and has been shown to boost bone-building markers and improve muscle mass, both of which may reduce the risk for osteoporosis and fracture.[65-69]

Immune Function:
There has been research on tea's potential impact on immune function. Research from Brigham and Women's Hospital and Harvard University indicated that tea contains a component that can help the body ward off infection and disease and that drinking tea may strengthen the immune system. L-theanine, found in tea, primes the immune system in fighting infection, bacteria, viruses and fungi.[70] A human clinical trial showed that certain immune cells of participants who drank five cups of black tea a day for two to four weeks secreted up to four times more interferon, an important part of the body's immune

defense, than at baseline. The study suggests that drinking black tea provides the body's immune system with natural resistance to microbial infection.[70] Current research indicates that tea's catechins provide potential preventive effects on influenza and common cold, although more research is needed.[71]

Caffeine Content: Tea is naturally low in caffeine. A cup of Black Tea, for example, contains about 40 milligrams of caffeine.

Cost Per Serving: Prepared at home, tea costs about three cents per serving, cup or glass. Tea continues to remain one of the most economical beverages available, even the most expensive teas are less than 10 cents per serving.

Tea: Tea is a refreshing beverage that tastes great and contains no sugar, sodium, or fat. In addition to being naturally calorie-free, it contributes to total water intake promoting hydration.

Key Tea Terms: Antioxidant: A substance that helps prevent or delay oxidative damage caused by reactive oxygen and or reactive nitrogen species. Oxidative damage to the body, cells and tissues may contribute to diseases like cancer and heart disease.

Phytochemicals: Naturally occurring plant compounds. Many phytochemicals are thought to play a role in decreasing the risk of cancer and heart disease and may boost the immune system. Some phytochemicals such as tea flavonoids are also antioxidants.

Flavonoids: A class of polyphenolic phytochemicals found in tea that are effective antioxidants. Tea flavonoids and related bio-active compounds in tea may play important roles in various areas of heath and may operate through a number of different mechanisms still being explored. Tea consumers have been shown to have approximately 20 times higher flavonoid intake compared with nonconsumers.[6]

Flavonols: A group of flavonoids found in tea and many fruits and vegetables that are antioxidants and are thought to contribute to some of the potential health benefits in these plant foods. They include rutin, quercetin and kaempferol.

Epigallocatechin gallate (EGCG): The principle catechin in Green and Black Teas. EGCG is a strong antioxidant and has

been shown to reduce formation of lung, esophageal and skin tumors in animal models of human cancer.

Theanine: An amino acid commonly found in tea that can cross the blood-brain barrier, therefore has psychoactive properties. It may reduce mental and physical stress, and may produce feelings of relaxation by increasing levels of gamma-aminobutyric acid (GABA), serotonin, dopamine, and alpha wave activity.

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