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TEA, A HEALTHY GIFT (12/2008)

Bottom Line at the Top: Drinking 1 to 6 cups of green or black tea daily might reduce your risk of cancer, heart disease, tooth decay and high cholesterol. Excessive amounts can cause brittle bones and affect blood levels of medications.

Oh, the agony of holiday gift buying, especially for colleagues, neighbors and acquaintances, whose taste we can only guess. We could abdicate decision-making by giving a fat-laden food basket, and shorten the recipients' lifespan, eliminating years of searching for the perfect gift. Instead, pretend you care, with tea. Tea, along with those too-cute teapots and specialty tea-balls, fulfills your gift obligation with something cute, consumable, biodegradable AND potentially healthy.

Throughout the world, tea ranks second only to water as the most consumed beverage. In the U.S. it has always played second fiddle to coffee, perhaps the legacy of rejecting England at the Boston Tea Party in 1773. Stubborn folk, we Americans, it took us over 120 years to let tea make a come-back. Since the 1990's tea sales in the U.S. have more than quadrupled along with a proliferation of tea houses, specialty shops, and teas from far-flung origins.

People drink tea because of taste and custom: Health benefits are a pleasant extra. Though inconclusive research has led the **Food and Drug Administration to refuse to allow tea makers to make health claims**, evidence mounts for a role of tea in preventing cancer, heart and vascular disease, tooth decay and infection.

Since some of these benefits take 10 or more cups of tea a day, using tea to prevent disease probably isn't practical. But **tea heads us in the direction of health better than, say, Rock Star or Coke.**

All real tea comes from the *Camellia sinensis* plant, a white-flowered, sub-tropical evergreen. Producers pick the top few inches of the plant's leaves and leaf buds and create a variety of tea types by regulating how much the leaves oxidize after picking. After plucking, tea leaves oxidize via natural enzymatic reactions that result in distinctive color and taste characteristics. Heating tea leaves by steaming, roasting or pan-firing at pre-specified times stops oxidation by destroying the enzymes, and determines the type of tea.

White tea is the sun-dried, unopened, plant leaf. Tea leaves that are immediately heated, rolled and dried after picking to seal their contents are known as green tea. Leaves partially oxidized for 1-2 hours before heating creates Oolong tea. Black tea leaves are fully oxidized before the heating process.

Chai tea is a redundant term, since chai is the name for tea in some Eastern countries. In the West, chai is black tea that is brewed strong, diluted with milk, and combined with sugar and spices, like cinnamon, cardamom, cloves, pepper and ginger.

Flavored teas start with real tea and add spices or herbs. Herbal 'teas' are infusions of leaves, roots, bark, seeds or flowers of plants other than C*amellia sinensis*, so they are not tea. They lack many of the unique characteristics of tea and the research concerning health benefits of real tea does not apply.

Tea leaves contain more than 700 components, some of which are healthy. Tea has a few amino acids, vitamin C, vitamin E and enough vitamin K to interfere with Coumadin (warfarin) blood-thinning.

Tea contains bioflavonoids called catechins, believed to be responsible for tea's anti-oxidant and health benefits. The most studied and only standardized catechin is epigallocatechin-gallate (EGCG for short). Instant iced tea contains negligible

amounts of EGCG. **White and green teas contain more EGCG than does black tea**, because of its partial destruction by oxidation.

Conversely, **black tea contains more L-theanine**, which seems to stimulate the immune system to better fight off colds and other infections. While tea extracts can be standardized to their EGCG content, tea itself cannot. **Flavonoid potency varies with cultivation, manufacture and brewing techniques.**

Tea contains the **toxic minerals** arsenic, chromium, cadmium and lead in variable levels, depending on where the tea was grown and how it was processed.
While tea may increase zinc and selenium levels, it **reduces body iron** by preventing its absorption from food.

Tea also **contains caffeine, theobromine and theophylline, all stimulants**. The latter two open the airways in asthmatics.

Cancer: Populations who drink more tea generally have fewer cancers of the mouth, breast, stomach, lung and skin. We don't yet have a clear idea if the protection comes from tea or some other lifestyle habit of tea-drinkers.

Some cancers start with oxidized or otherwise damaged cellular genetic material (DNA). In lab experiments, tea antioxidant bioflavonoids neutralize oxidant stress before cell injury can occur. Scientists postulate that tea inhibits cancer growth by decreasing and possibly repairing oxidant damage to our cells' genetic material. Four cups of tea daily reduces the excessive oxidative damage in heavy smokers' cells that might lead to cancer.

Bioflavonoids can also bind to carcinogens, induce tumor cell death, arrest cell growth and halt spread to distant organs. In various animal studies green or black tea blocks growth of a variety of tumor types, including liver, stomach, and skin.

Human intervention studies are not uniformly positive. A large Netherlands study of more than 100,000 55-69 year olds found no link between tea consumption and protection against cancer, but many other studies find a benefit.

In China, a study of more than 18,000 men found that tea drinkers were about half as likely to develop stomach or esophageal cancer as men who drank little tea. Post-menopausal women in Iowa who drank two or more cups of tea per day developed fewer digestive and urinary tract cancers. Directly applied tea extracts partially shrink some pre-cancerous lesions of the mouth. Polish women who drank black tea daily had a reduced risk of stomach cancer. Japanese who drink large amounts of green tea are less likely to get stomach or esophageal cancer. Japanese breast cancer survivors who drink more than 2 cups of tea per day are less likely to have a cancer recurrence. In Arizona, people who drink stronger tea have less skin cancer.

Weight: Some people promote tea to aid weight loss, but so far the evidence is weak. People who drink more tea tend to pack on less body fat, but it may be because they also practice other healthy habits, like exercising and eating vegetables. A few studies hint of a metabolism-boosting effect of green tea over and above the caffeine effect, but the evidence is weak. **We need more research before we can tout green tea as a miracle weight loss aid.**

Consumers should *not* confuse black or green tea with "dieter's teas" advertised for weight loss. Those products contain senna, aloe, rhubarb root, buckthorn, cascara, or castor oil additives, which exert potent diuretic and/or laxative effects on the body. Besides leading to some serious bathroom time, they can screw up electrolytes and drop blood pressure in ways that might mess with the heart.

Arrhythmias: Tea contains caffeine, a stimulant that raises heart rate and blood pressure. It does not cause dangerous heart rhythms in people with normal hearts, but for those who already have irregular or rapid heart beats, less caffeine is better. Switching from coffee to black tea cuts caffeine intake from over 140 mg to about 50 mg, and the jump to green tea drops it further to 14-37 mg/cup.

Teeth: Forget the fluoride toothpaste and drink tea, which on average contains 0.78 mg of fluoride per 8-ounce cup. **At 5-7 times the quantity in fluoridated water, but under the Environmental Protection Agency's safe upper limit, tea can be good for your teeth.** It's good for hamsters, who have 64% fewer cavities if they drink tea instead of water. The only dangers might be discolored teeth and brittle bones from exposure to excess fluoride over time.

Bone: Tea packs a two-fer injury on bones. Caffeine lowers bone density and tea's fluoride causes abnormal calcium deposits, called osteosclerosis. Even though the bones look better bone density scan, they actually **fracture more easily because of their brittle structure.**

Heart: Tea drinkers seem to have fewer heart attacks than non-tea drinkers. Some investigators find that, in people with and without previous heart disease, drinking at least one cup of tea daily reduces subsequent heart attacks and the chance of dying, by up to 40%.

But not every study finds the same benefit with tea. Some studies even link tea to more heart problems. **Lumping together 13 published studies of tea and heart disease, with both positive and negative results, an estimated 11 percent fewer heart attacks occur in those who drink three or more cups of tea per day.**

How might tea keep the heart's arteries from closing off? EGCG seems to keep platelets from clotting and sticking to artery walls, where they could contribute to plaque build-up that clogs blood flow. Tea's effects on cholesterol and blood vessel relaxation might also protect against heart attack.

Lipids: Large doses of tea (more than 5 cups per day) or tea extract lower cholesterol levels in people who have a problem with high cholesterol.

Tea seems to attack cholesterol and triglycerides (fat in the blood) in three ways. First, high doses of EGCG or tea partially block absorption of fat and cholesterol from food.

Second, in lab experiments tea's bioflavonoids keep the bad (LDL) cholesterol from oxidizing, which makes it dangerous and likely to clog arteries. The effect is weak in a live person, but might help.

Third, tea stimulates cells to clear fat from the blood in the same way that the fibrate class of medication class does. Black tea is more effective than green or oolong tea, so EGCG plays at best a partial role.

Blood vessels: In lab tests on isolated blood vessels, EGCG relaxes blood vessel walls. In intact humans, **diets high in bioflavonoids from all sources (including tea) or four cups of black tea a day improve blood vessel function, allowing them to constrict and relax appropriately.**

One might think that this would help blood pressure, but tea drinkers do not uniformly have lower pressure. Perhaps tea's caffeine and theobromine content raise pressure enough to offset the bioflavonoids' blood pressure benefits.

Diabetes: In small studies of diabetics, those who drink six cups of tea daily can lower their blood sugar by 15 – 20%. Whether the tea works directly or by filling up their stomachs so they eat and drink fewer calories is unclear. **Tea probably helps diabetics more through its effects on blood vessels, lipids and anti-oxidation than by directly lowering blood sugar.**

Infectious disease: Black tea's L-theanine primes certain types of immune system cells to fight off colds, the flu and diarrheal illness. It augments bacterial killing by antibiotics. An experimental de-caffeinated tea containing extra L-theanine and ½ the usual amount of EGCG allowed people to recover from the colds much sooner than with placebo, reducing days of symptoms by one-third.

Drug metabolism: Green tea partially blocks drug and toxin clearance mechanisms, known as CYP3A4 and P-gp. If these are blocked, drugs that require them for clearance from the bloodstream might accumulate in toxic levels. For example, a case of a green tea drinker developing severe muscle damage from high simvastatin levels (a drug for cholesterol) has been reported.

Adverse side effects: As already mentioned, tea might cause lower blood iron levels, exposure to the toxic minerals arsenic, chromium, cadmium and lead, enough vitamin K to influence Coumadin effect, higher levels of medications that use CYP3A4 for metabolism, brittle bones and brown teeth. **It would seem that moderation in tea, to reap health benefits without toxicity, would be best.**

Take a break: Even if tea won't prolong your life, taking time for a relaxed afternoon cup of tea jump-starts the second half of the day. For most people, mid-afternoon is slump time. **A complete break from high gear to enjoy the warmth and ceremony of tea refreshes the soul for the day's last inning.**