

Supplement Sampler Green Tea

Best Indications

Likely effective for:

- Genital warts.

Possibly effective for:

- Cancer (prevention of bladder, esophageal, ovarian, pancreatic; treatment of cervical dysplasia, oral leukoplakia),
- High cholesterol (may decrease LDL and triglycerides).

Mechanism of Action

The leaf, bud, and stem are all used medicinally, but green tea primarily comes from the fresh leaves.

Two important classes of chemicals in green tea include:

- Alkaloids (caffeine, theobromine, theophylline), which are nervous system stimulants.
- Polyphenols (catechins, anthocyanins, phenolic acids), which are antioxidants.

Many of the exact mechanisms are unknown, but laboratory research suggests that polyphenols can prevent inflammation and cancer growth. Most of the polyphenols in green tea are called catechins, and there are six main types: catechin, gallaogatechin, epicatechin, epigallocatechin, epicatechin gallate, and apigallocatechin gallate. The latter catechin has been studied the most and deemed the most active. Green tea also contains L-theanine, an amino acid that is gaining in popularity, and that is thought to relieve anxiety. As an isolated supplement, research has been insufficient to determine if this is the case.

Best Studies

- *Kuriyama S, Shimazu T, Ohmori K, et al. Green tea consumption and mortality due to cardiovascular disease, cancer, and all causes in Japan: the Ohsaki study. JAMA 2006;296:1255-1265.*

These investigators analyzed data from a large population-based cohort of 40,530 persons living in northeastern Japan where green tea is widely consumed. They controlled for many confounding variables, including age, job status, body mass index, exercise, history of diabetes, hypertension, or gastric ulcer, smoking and alcohol use, and other food consumption. Overall, *green tea consumption was significantly associated with lower all-cause and cardiovascular mortality*. Women drinking more than one cup per day had lower mortality, though men did not have a decreased mortality unless they drank more than five cups per day. There were no associations in cancer mortality. The relationship between green tea consumption and cardiovascular mortality was only significant in those who never smoked.



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- *Tatti S, Swinehart JM, Thielert C, et al. Sin catechins, a defined green tea extract, in the treatment of external anogenital warts: a randomized controlled trial. Obstetrics and Gynecology 2008;111(6): 1371-9.*

This was a randomized, double-blind, placebo-controlled trial with 502 participants with anal warts. Patients applied a standardized green tea ointment (see dose section below) for 16 weeks. Complete clearance was demonstrated in just over 50% in the treatment group versus about one third of control participants, with a number needed to treat (complete clearance) of about four.

Dose

- **Green tea infusion/beverage** (best option for health benefits): studies range from 1-10 cups per day. One cup= 50 mg caffeine and 50-150 mg polyphenols. Many health benefits found in Asian countries were found among those drinking about three cups per day (240-320 mg polyphenols). To brew, use about one teaspoon per eight ounces of boiling water.
- **Green tea extracts** are typically standardized to 150-750 mg polyphenols per day standardized to about 80% total polyphenols and 50% epigallocatechin gallate and in three divided doses. These are available in dry leaf, capsule form as well as liquid extracts made from the leaves and buds.
- **Green tea extract ointment** (Veregen, Bradley Pharmaceuticals) with 15% sin catechins is FDA-approved for treating genital warts. Apply three times daily for up to sixteen weeks.

Some individuals may benefit from *reduced caffeine* options, and not all these products are the same. Direct your patients to find green teas that have been decaffeinated using the “effervescence” or “CO₂ method” rather than using ethyl acetate (a toxin at high doses). Also, they may wish to consider decaffeinating green tea at home by brewing caffeinated green tea for about two minutes, discarding it, and then brewing it again in a second cup. The latter cup will only have about 20% of the caffeine as the original cup. Does this process of decaffeination affect the polyphenol content? Probably a little, but if limiting caffeine is desirable, this is still great option.

Side Effects

Green tea served as a beverage (infusion) is **LIKELY SAFE**. Green tea extracts are **POSSIBLY SAFE** when used over the short-term.

Over 5 cups/day of green tea is considered an overdose due to side effects of excessive caffeine intake and is **POSSIBLY UNSAFE**. Side effects from caffeine can include frequent urination, nausea, diarrhea, upset stomach, irritability, and anxiety.

For those taking concentrated green tea extracts (not beverages), there have been some case reports of *liver problems*. Although this evidence is not definitive, concentrated forms of green tea should be taken with food. Instruct patients to contact you if they experience jaundice, dark urine, or abdominal pain as these may signal liver trouble. Further, lead has been found to contaminate some concentrated green tea extracts.



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Consuming large amounts of green tea may also disrupt folate synthesis and increase the risk of related birth defects. Catechins in green tea inhibit the enzyme dihydrofolate reductase in vitro, which converts folic acid to its active form. Provisional evidence supports the claim that increasing maternal tea consumption is associated with spina bifida risk. As a precaution, one should avoid green tea consumption, or at least limit quantities, during the preconception and prenatal period.

Cost

- Green tea infusion/beverage: \$0.20 to 2.00 per one teaspoon. Encourage patients to consider purchasing organic, whole leaf, and fair trade products, such as those from Rishi tea, based in Milwaukee, Wisconsin. <http://www.rishi-tea.com>

Green tea-containing beverages commonly found at convenience locations contain large amounts of sugar and are *not* recommended.

- Green tea extracts (approved by ConsumerLab)
 - *Andrew Lessman's Green Tea (EGCG-200)*: \$0.35/day
 - *FoodScience of Vermont Green Tea Extract*: \$0.34/day
 - *Nature's Bounty Natural Whole Herb Green Tea Extract*: \$0.15/day
 - *Vitality Works Daily Green Tea*: \$0.24/day
- Green tea extract ointment (*Veregen, Bradley Pharmaceuticals*): requires prescription, 1 tube (15 grams): \$357.99

Given this expense (though not used in clinical trials), patients may want to make a green tea poultice. See instructions at: http://herbs.lovetoknow.com/Green_Tea_Poultice .

Comments

Green tea is the most widely consumed beverage in the world second to water and has been used for thousands of years. Green, white, black, and oolong tea are all produced, using different methods, from the *Camellia sinensis* plant. Green tea is produced from fresh leaves, while oolong and black teas are from partially and fully fermented leaves, respectively. White tea is derived from the young, budding leaves that do not yet contain chlorophyll, and the leaves are not dried, producing a light-colored beverage. It is similar to green tea but has less caffeine and may have more antioxidants, making it a good alternative to green tea.

Clinical Bottom Line

Green tea may have a wide range of health benefits and should be a recommended part of a broad, whole food-based diet. Evidence strongly supports its use for genital warts. Research addressing a number of chronic conditions, from heart disease to cancer, is promising but not yet conclusive.

Brought to you by David Lessens, MD, MPH, Fellow, and your colleagues in the University of Wisconsin-Madison Department of Family Medicine, Integrative Medicine Program.

*Date created: September 2012
Date revised: November 2012*