Cancer prevention by green tea: evidence from epidemiologic studies¹,²,³,⁴

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Author Notes

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Abstract

In contrast to the consistent results of an inhibitory effect of green tea extracts and tea polyphenols on the development and growth of carcinogen-induced tumors in experimental animal models, results from human studies are mixed. Both observational and intervention studies have provided evidence in support of a protective role of green tea intake in the development oral-digestive tract cancer or an inhibitory role of oral supplementation of green tea extract on a precancerous lesion of oral cavity. Evidence in support of green tea intake against the development of liver cancer risk is limited and inconsistent. An inverse association between green tea intake and lung cancer risk has been observed among never smokers but not among smokers. Although observational studies do not support a beneficial role of tea intake against the development of prostate cancer, several phase 2 clinical trials have shown an inhibitory effect of green tea extract against the progression of prostate
Premalignant lesions to malignant tumors. Prospective epidemiologic studies so far have not provided evidence for a protective effect of green tea consumption on breast cancer development. Current data neither confirm nor refute a definitive cancer-preventive role of green tea intake. Large randomized intervention trials on the efficacy of green tea polyphenols or extracts are required before a recommendation for green tea consumption for cancer prevention should be made.

David, below is another version of the same study by another author, can you please see which one is better for our website?
Abstract

Tea (*Camellia sinensis*) is a widely consumed beverage and has been extensively studied for its cancer-preventive activity. Both the polyphenolic constituents as well as the caffeine in tea have been implicated as potential cancer-preventive compounds; the relative importance seems to depend on the cancer type. Green tea and the green tea catechin have been shown to inhibit tumorigenesis at a number of organ sites and to be effective when administered either during the initiation or postinitiation phases of carcinogenesis. Black tea, although not as well studied as green tea, has also shown cancer-preventive effects in laboratory models. A number of potential mechanisms have been proposed to account for the cancer-preventive effects of tea, including modulation of phase II metabolism, alterations in redox environment, inhibition of growth factor signaling, and others. In addition to the laboratory studies, there is a growing body of human intervention studies suggesting that tea can slow cancer progression and modify biomarkers relevant to carcinogenesis. Although available data are promising, many questions remain with regard to the dose-response relations of tea constituents in various models, the primary mechanisms of action, and the potential for combination chemoprevention strategies that involve tea as well as other dietary or pharmaceutical agents. The present review examines the available data from laboratory animal and human intervention studies on tea and cancer prevention. These data were evaluated, and areas for further research are identified.

Full article:

Medscape Medical News > Oncology

Green Tea for Cancer Prevention: A Mixed Bag

Roxanne Nelson

Can something as simple as drinking green tea prevent cancer?

A large and growing body of evidence — both preclinical and human trials — suggests that there is a protective effect across different types of cancer. However, the data are not definitive.

The preventive effects of tea for a number of cancer types have been demonstrated in laboratory models, including cancers of the gastrointestinal tract, lung, prostate, breast, and skin. The proposed mechanisms of action include antioxidant effects, inhibition of growth-factor signaling, and enhancement of chemotherapy agents.

Much of the research to date, both experimental and clinical, and suggestions for future studies are outlined in 2 reviews published online October 30 in the *American Journal of Clinical Nutrition*.

Tea contains a large number of bioactive compounds, including catechins, flavonols, lignans, and phenolic acids, notes Jian-Min Yuan, MD, PhD, from the division of epidemiology and community health at the University of Minnesota in Minneapolis. In his review, he asserts
that recent epidemiologic studies "neither confirm nor refute a definitive cancer-preventive role of green tea intake."

The large number of experimental studies conducted have consistently shown the inhibitory activities of green tea extract and/or green tea polyphenols against tumorigenesis at various organ sites, Dr. Yuan notes. However, results from epidemiologic studies have been inconsistent.

**Inconsistent Results**

For example, Dr. Yuan recently reviewed epidemiologic studies looking at the association between esophageal cancer and green tea consumption in Asian populations, which have a high incidence of esophageal cancer and a high consumption of green tea (Mol Nutr Food Res. 2011;55:886-904). Of the 15 such studies, 6 reported a significantly reduced risk for esophageal cancer associated with high amounts of tea consumption, 4 reported a lower but nonsignificant risk, 3 reported a significantly positive association between tea consumption and esophageal cancer risk, and 2 reported no association.

Other reviews have reported similar inconsistencies for different cancer types, including colon, liver, breast, and prostate.

In the future, "we should conduct phase 2 intervention studies to understand the biologic mechanism of green tea polyphenols or other constituents in humans, given that current knowledge on tea and cancer protection is primarily derived from in vitro and in vivo animal experiments," Dr. Yuan told Medscape Medical News.

It would not be difficult to design and conduct phase 2 studies to learn the biologic mechanisms related to some of the known cancer-risk pathways in humans, Dr. Yuan contends. "The limiting factor is funding," he noted. "Of course, the final word on the effect of tea polyphenols on cancer prevention should come from phase 3 randomized large intervention trials that evaluate cancer incidence and mortality as study outcomes. Such trials would require a large number of subjects (more than 50,000), a long study period (at least 5 years), and a large number of institutions and investigators."

Dr. Yuan points out that a number of uncontrolled variables could account for inconsistent results from epidemiologic studies. Human exposure to tea polyphenols is relatively low — in the range of 1 to 2 orders lower than those generally used in in vitro and in vivo experimental studies. There is also the "residual confounding effect of cigarette smoking and alcohol consumption," along with the "adverse effect of the high temperature of tea beverages, which could mask or complicate the tea–cancer risk association."

The heterogeneity of the amount of tea consumed and the eating habits of different populations can also contribute to the inconsistencies seen in the results. These confounders help emphasize the need for randomized intervention studies that can ultimately provide "definitive data to determine the beneficial or deleterious effects of green tea consumption on cancer development in humans," Dr. Yuan writes.

**Promising in Early-Stage Disease Only**

In his review, Joshua D. Lambert, PhD, associate professor of food science at Pennsylvania State University in University Park, looked at human and experimental studies. He notes that green tea and green tea catechin have been shown to inhibit tumorigenesis and that, although it has not been as well studied as green tea, black tea has also shown cancer preventive
effects. The polyphenolic constituents in tea, along with the caffeine content, have been implicated as potential cancer-preventive compounds.

In his comprehensive review of available data from both experimental studies and human clinical trials, he notes that the number of human studies that have directly examined the effects of green tea on cancer progression is limited.

Dr. Lambert cites an example of the effect of green tea on high-grade prostatic intraepithelial neoplasia. After a year of daily supplementation with green tea catechins 600 mg or placebo, fewer men in the tea group than in the placebo group progressed to prostate cancer (9% vs 30%) (Cancer Res. 2006;66:1234-1240).

Similar results were observed in a study that looked at the association between green tea consumption and oral premalignant lesions and the recurrence of metachronous colorectal adenomas in polypectomy patients (Cancer Epidemiol Biomarkers Prev. 2008;17:3020-3025).

In addition, a number of studies that have examined the effects of green tea on carcinogenesis-relevant biomarkers in humans have shown positive effects.

"As might be expected, studies that have examined early-stage disease have been promising, whereas those that have dealt with late-stage disease have largely yielded negative results," writes Dr. Lambert. "These data indicate that tea and tea compounds likely lack sufficient potency to serve as first-line chemotherapeutic compounds but do have a role to play in both primary prevention and prevention of cancer recurrence."

Research is needed to develop additional preventive combinations involving tea and pharmaceutical or dietary components. There is also a "dearth of information regarding the biological activity of the metabolites of the tea polyphenols," he notes.

Dr. Lambert adds that even though the number of human intervention studies is increasing, the available data remain scant and are relatively limited in scope.

**Tea or Supplements?**

Although some studies used supplements and others involved tea consumption, Dr. Yuan recommends drinking tea to get a potential health benefit.

"The best approach is to drink a sufficient amount of tea on daily basis that hopefully provides a potential health benefit," he said. "Dietary supplementation with a concentrated form of tea polyphenols to receive a cancer-protection effect is premature and not supported by research evidence, particularly in humans."

In addition, he pointed out that it is not known which specific tea polyphenols provide the protective effect, or how much is actually needed. "Tea polyphenols at very high doses have side effects," he noted.

For now, drinking tea is safe and inexpensive, and many enjoy the taste. "For people at high risk for oral cancer, for example, tea supplementation seems to slow the progression of oral precancer lesions," Dr. Yuan said. "However, it is premature to say that drinking green tea can help normal healthy individuals stay cancer-free, since the cancer preventive effect of green tea and its constituents have yet to be confirmed."

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