



# GREEN TEA AND YOUR HEALTH



**G**reen tea is regarded by many as a “miracle tea” and is reputed to be beneficial for many medical conditions such as: cancer, rheumatoid arthritis, high cholesterol levels, cardiovascular disease, neurodegenerative diseases, liver disease, halitosis, infection and impaired immune function. What exactly is green tea, and is it really so special?

Green tea originated in China but has now become associated with other cultures in Asia, such as

Japan. Green tea is prepared solely from the leaves, leaf buds, and internodes of the tea plant *Camellia senensis*, which is the same plant used to produce other teas such as black tea and oolong tea. The type of tea is determined by how it has been processed. Tea leaves wilt, oxidize rapidly and turn dark after they are picked. If this is allowed to happen, black tea will be the result. Oolong tea is made from leaves which have wilted, bruised and allowed to partially oxidize. Green tea is produced from leaves which are wilted after picking but have not been allowed to oxidize.

## Biochemical Properties

Green tea contains significant quantities of polyphenols (a group of chemical substances). Among these are catechins, antioxidants which neutralize the effects of free radicals, which are highly reactive molecular species that occur

naturally in the body. Free radicals are damaging to cells.

Cancer cells develop because of damage to the DNA (deoxyribonucleic acid), the substance in the nucleus of the cell that carries the genetic information and controls the structure and purpose of the cell. Because of its antioxidant properties, which protect the DNA from damage, green tea is thought to have some protective properties against a range of cancers, including lung, prostate and breast cancer by:

- inactivating oxidants before cell damage occurs;
- reducing the size of tumours; and
- inhibiting the growth of cancer cells without harming healthy tissue.

Epigallocatechin gallate (EGCG) is one of the most abundant catechins in tea and has the most powerful antioxidant properties.

Research has shown that its rich antioxidant properties protect the heart and arteries from oxidative damage and may even protect the skin from ultraviolet radiation to reverse precancerous changes.

Green tea also contains nutrients such as Vitamin C and alkaloids including caffeine, theobromine and theophylline, which give green tea, like coffee, a stimulant effect.

There is evidence that green tea may play a role in weight loss by increasing metabolic rates and speeding up fat oxidation. EGCG again is thought to be the important polyphenol antioxidant in green tea that promotes weight loss by a process called thermogenesis that allows the body to burn more calories than is taken in. In one of these studies carried out on 38 men in Japan, individuals who consumed green tea containing 690 mg catechins daily for 12 weeks reduced their body fat and lowered their low density lipoprotein (LDL) levels. LDL is regarded as bad cholesterol because when it circulates in the blood it can slowly build up in the inner walls of the arteries that feed the heart and brain. This forms a plaque that leads to a condition known as arteriosclerosis, which forms clots that can block a narrowed artery resulting in heart attack or stroke.

Blood sugar levels in diabetic persons may be controlled by the polyphenols within green tea. This is seen particularly in Type 2 diabetes, which is characterized by insulin resistance, relative insulin deficiency and hyperglycaemia.

Studies also suggest that there may be a link between tea drinking and reduced risk of Type 2 diabetes.

Drinking green tea may even lower chances of cognitive impairment. Dementia, a problem that affects the aging population is due to a loss of brain function. It is not a single disease but refers to a group of mental illnesses that involves memory, behaviour, learning and communication problems. Alzheimer's disease and vascular dementia (caused by a series of small strokes) are the major causes of degenerative or non-reversible dementia. Research and studies indicate that green tea can protect against these diseases. For example, Japanese men drinking two cups of green tea per day had a 50 percent lower chance of having cognitive impairment in comparison to those who drank fewer than two cups per day. The polyphenols in green tea especially epigallocatechin (EGCG), might explain the observed association with the tea and improved cognitive function.

Other effects of the polyphenols in green tea include helping to inhibit the growth of bacteria and the bad smelling compounds that these organisms produce which cause bad breath and tooth decay. This has resulted in the tooth paste industry including green tea as one of the newest ingredients. Green tea is used in ointments and pills as therapy for genital warts caused by HPV (human papilloma virus). HPV infection, which causes genital warts and cervical cancer,

has no cure but green tea's antioxidants help patients to treat warts caused by infection. Research conducted on the effect of green tea on HIV (Human Immunodeficiency Virus) found that EGCG found within the tea could help to boost the immune system, and this is an area in which research continues.

### Possible Negative Effects

What are the potential drawbacks of green tea? The effect of fluoride, which is found in all tea leaves with mature leaves containing as much as 10 to 20 times the fluoride levels of young leaves, is one drawback. High fluoride content in tea could cause neurological damage and renal damage especially in the presence of aluminum. High fluoride content could also cause osteoporosis, arthritis and other bone disorders. In general, however fluoride in tea relates to the EGCG content. If EGCG is high, less fluoride is present in the tea.

Green tea contains caffeine but in a substantially less quantity than coffee. A cup of green tea contains between 15 mg and 50 mg caffeine. Caffeine, despite positives such as boost in energy, is addictive and may increase likelihood of certain sleep disorders. Decaffeination of tea reduces the total catechins by about three times, making the caffeine-free alternative less effective.

Pregnant women are cautioned when drinking green tea because of the possible increase in the risk

of birth defects such as *spina bifida*. This occurs because folic acid levels (also known as folate) are reduced. Folic acid is a vitamin found in green leafy vegetables and is important for the development of the neural tube of the foetus. It is thought that EGCG binds to an enzyme in the cancer cell called dihydrofolate reductase (DHFR) stopping the growth of the cancer cell. It is this anti-cancer property of green tea that causes a possible problem in pregnancy. DHFR is necessary for folic acid utilization, and when it is bound may result in reduced folate. This is especially worrying in persons who are folate deplete.

In addition to its use as a hot or cold beverage, there are many supplements on the market made from green tea. Some have high levels of EGCG concentrated in pill form. However, long-term high doses of EGCG on a daily basis may be potentially harmful. The active ingredients within green tea may interact with other herbs and supplements. For example, the tannins in tea inhibit the absorption of iron from supplements and food. This is a concern for persons at risk of iron deficiency, such as pregnant women and young children. Pregnant women are advised to not take tea at the same time as iron-rich foods and iron supplements.

### Interactions with Drugs

Green tea also interacts with certain medications, and users of

green tea undergoing treatment with these should seek a doctor's advice because of their possible interaction. These medications include some antibiotics, aspirin, propranol and metoprolol, which are beta-blockers used for high blood pressure and heart, disease, oral contraceptives and blood thinning medications such as warfarin.

Green tea may increase the action of beta-lactam antibiotics (such as penicillin derivatives) by reducing bacterial resistance to treatment, thereby causing possible toxicity from the increased effects of the drug. Aspirin use increases the risk of bleeding when it is combined with green tea because they both prevent the blood platelets from clotting. Green tea contains vitamin K and for persons who are on blood thinning medications such as warfarin, use of green tea may render the drug less effective. Caffeine, although in a relatively smaller quantity in green tea than some other beverages, may increase the blood pressure in persons using beta blockers such as propranolol and metoprolol. Oral contraceptives can prolong the amount of caffeine that stays in the body so green tea may have an increased stimulating effect for women taking contraceptives.

### What's Your Cup of Tea?

The less processed your green tea the better. Adding lemon or milk may reduce the health benefits. Lemon diminishes the

antioxidant properties and the casein in milk binds to EGCG, thereby reducing the antioxidant and thus lessening any anti-cancerous effect. Soymilk having no casein, does not have the same effect as milk on tea, and may be used as an alternative.

Tips for brewing green tea:

- If possible, use loose tea leaves. Use 1 teaspoon of tea for every cup (240 ml/8 oz) of water.
- Steep your tea for one to three minutes. A longer steeping time results in a greater polyphenol content, while a shorter steeping time results in a high caffeine content but low polyphenol content.
- Boiling water increases the amount of polyphenols in the green tea. The tea will be bitter and much of its delicate aroma will be lost. If the water temperature is too cool, the full flavour contained in the leaves will not be extracted. Use water at a temperature of about to 75 to 85°C (165 to 185 F). You can heat the water to boiling and then let it cool for 30 to 60 seconds before pouring into your teapot or cup.

Enjoy your tea!



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