Black tea (*Camellia sinensis*)

While some complementary and alternative techniques have been studied scientifically, high-quality data regarding safety, effectiveness, and mechanism of action are limited or controversial for most therapies. Whenever possible, it is recommended that practitioners be licensed by a recognized professional organization that adheres to clearly published standards. In addition, before starting a new technique or engaging a practitioner, it is recommended that patients speak with their primary healthcare provider(s). Potential benefits, risks (including financial costs), and alternatives should be carefully considered. The below monograph is designed to provide historical background and an overview of clinically-oriented research, and neither advocates for or against the use of a particular therapy.

Related Terms:

- Caffeine, camellia, *Camellia assamica*, camellia tea, *Camellia sinensis*, catechin, Chinese tea, green tea, oolong tea, tea for America, *Thea sinensis*, *Thea bohea*, *Thea viridis*, theifers.

BACKGROUND

- Black tea is made from the dried leaves of *Camellia sinensis*, a perennial evergreen shrub. Black tea has a long history of use dating back to China approximately 5,000 years ago. Green tea, black tea, and oolong tea are all derived from the same plant.
- Black tea is a source of caffeine, a methylxanthine that stimulates the central nervous system, relaxes smooth muscle in the airways to the lungs (bronchioles), stimulates the heart, and acts on the kidney as a diuretic (increasing urine). One cup of tea contains about 50 milligrams of caffeine, depending on the strength and size of cup (as compared to coffee, which contains 65 to 175 milligrams of caffeine per cup). Tea also contains polyphenols (catechins, anthocyanins, phenolic acids), tannin, trace elements, and vitamins.
- The tea plant is native to Southeast Asia and can grow up to a height of 40 feet, but is usually maintained at a height of two to three feet by regular pruning. The first spring leaf buds, called the *first flush*, are considered the highest-quality leaves. When the first flush leaf bud is picked, another one grows, which is called the *second flush*, and this continues until an *autumn flush*. The older leaves picked farther down the stems are considered to be of poorer quality.
- Tea varieties reflect the growing region (for example, Ceylon or Assam), the district (for example, Darjeeling), the form (for example, pekoe is cut, gunpowder is rolled), and the processing method (for example, black, green, or oolong). India and Sri Lanka are the major producers of black tea.
- Historically, tea has been served as a part of various ceremonies and has been used to stay alert during long meditations. A legend in India describes the story of Prince Siddhartha Gautama, the founder of Buddhism, who tore off his eyelids in frustration at his inability to stay awake during meditation while journeying through China. A tea plant is said to have sprouted from the spot where his eyelids fell, providing him with the ability to stay awake, meditate, and reach enlightenment. Turkish traders reportedly introduced tea to Western cultures in the 6th century. By the 18th Century, tea was commonly consumed in England, where it became customary to drink tea at 5 p.m.

- Black tea reached the Americas with the first European settlers in 1492. Black tea gained notoriety in the United States in 1773 when colonists tossed black tea into Boston Harbor during the Boston Tea Party. This symbolic gesture was an early event in the U.S. War of Independence against England.

SCIENTIFIC EVIDENCE

Uses *These uses have been tested in humans or animals. Safety and effectiveness have not always been proven. Some of these conditions are potentially serious, and should be evaluated by a qualified healthcare provider.*	**Grade***
Asthma Research has shown caffeine to cause improvements in airflow to the lungs (bronchodilation). However, it is not clear if caffeine or tea use has significant clinical benefits in people with asthma. Better research is needed in this area before a conclusion can be drawn.	C
Cancer prevention Several studies have explored a possible association between regular consumption of black tea and rates of cancer in populations. This research has yielded conflicting results, with some studies suggesting benefits, and others reporting no effects. Laboratory and animal studies report that components of tea, such as polyphenols, have antioxidant properties and effects against tumors. However, effects in humans remain unclear, and these components may be more common in green tea rather than in black tea. Some animal and laboratory research suggests that components of black tea may be carcinogenic, although effects in humans are not clear. Overall, the relationship of black tea consumption and human cancer remains undetermined.	C
Colorectal cancer Although there is strong evidence from animal and laboratory studies that black tea may help prevent colon cancer, human studies are limited. Additional research is needed.	C
Dental cavity prevention There is limited study of black tea as a mouthwash for the prevention of dental cavities (caries) or plaque. It is not clear if this is a beneficial therapy.	C
Diabetes Black tea may lower blood sugar levels. A combination of black tea green tea extract	

did not lower blood sugar levels in patients with type II diabetes. However, black tea alone did lower blood sugar and increase insulin levels in healthy patients. Additional research with black tea alone in diabetic patients is needed.	
Heart attack prevention / cardiovascular risk There is conflicting evidence from a small number of studies examining the relationship of tea intake with the risk of heart attack. Tea may reduce the risk of platelet aggregation or endothelial dysfunction, proposed to be beneficial against blocked arteries in the heart. The long-term effects of tea consumption on cardiovascular risk factors, such as cholesterol levels and atherosclerosis, are not fully understood. Other research suggests that drinking black tea regularly does not affect plasma homocysteine levels or blood pressure. Black tea may increase heart rate.	**C**
Memory enhancement Several preliminary studies have examined the effects of caffeine, tea, or coffee use on short and long-term memory. It remains unclear if tea is beneficial for this use.	**C**
Mental performance/alertness Limited, low-quality research reports that the use of black tea may improve cognition and sense of alertness. Black tea contains caffeine, which is a stimulant.	**C**
Metabolic enhancement Additional research is needed to understand exactly how black tea may affect human metabolism.	**C**
Methicillin-resistant Staphylococcus aureus (MRSA) infection In one small study, inhaled tea catechin was reported as temporarily effective in the reduction of MRSA and shortening of hospitalization in elderly patients with MRSA-infected sputum. Additional research is needed to further explore these results.	**C**
Oral leukoplakia/ carcinoma Early studies report that black tea may lead to clinical improvement in oral leukoplakia and therefore prevent oral carcinoma. Further research is needed to confirm these results.	**C**
Osteoporosis prevention	

Preliminary research suggests that chronic use of black tea may improve bone mineral density (BMD) in older women. Better research is needed in this area before a conclusion can be drawn.	C
Stress Based on early research, black tea may reduce stress and help patients feel more relaxed. More research is needed to confirm these findings. It should be noted that high doses of caffeine have been linked to anxiety.	C
Weight loss Black tea has been used as part of a combination supplement to help patients lose weight. Although patients in the study lost weight, the effects of black tea alone are unclear.	C

Key to grades: **A: Strong scientific evidence for this use; **B**: Good scientific evidence for this use; **C**: Unclear scientific evidence for this use; **D**: Fair scientific evidence against this use (it may not work); **F**: Strong scientific evidence against this use (it likely does not work).*

TRADITION/THEORY

The below uses are based on tradition, scientific theories, or limited research. They often have not been thoroughly tested in humans, and safety and effectiveness have not always been proven. Some of these conditions are potentially serious, and should be evaluated by a qualified healthcare provider. There may be other proposed uses that are not listed below.

- Acute pharyngitis, antioxidant, anxiety, cancer multidrug resistance, circulatory/blood flow disorders, cleansing, Crohn's disease, diarrhea, diuretic (increasing urine flow), gum disease, headache, hyperactivity (children), immune enhancement/improving resistance to disease, influenza, joint pain, kidney stone prevention, melanoma, obesity, osteoarthritis, pain, prostate cancer, stomach disorders, toxin/alcohol elimination from the body, trigeminal neuralgia, vomiting.

DOSING

The below doses are based on scientific research, publications, traditional use, or expert opinion. Many herbs and supplements have not been thoroughly tested, and safety and effectiveness may not be proven. Brands may be made differently, with variable ingredients, even within the same brand. The below doses may not apply to all products. You should read product labels, and discuss doses with a qualified healthcare provider before starting therapy.

Adults (18 years and older)

- Black tea has not been proven as an effective therapy for any condition and benefits of specific doses are not established. A maximum of eight cups of black tea daily has been suggested. One cup of tea contains approximately 50 milligrams of caffeine, depending on the strength of the tea and the size of the cup.

Children (younger than 18 years)

- There is a lack of available information about the safety or effectiveness of black tea in children. Due to the caffeine content, caution is advised.

SAFETY

The U.S. Food and Drug Administration does not strictly regulate herbs and supplements. There is no guarantee of strength, purity or safety of products, and effects may vary. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy. Consult a healthcare provider immediately if you experience side effects.

Allergies

- People with known allergy/hypersensitivity to caffeine or tannin should avoid black tea. Skin rash and hives have been reported with caffeine ingestion.

Side Effects and Warnings

- Studies of the side effects of black tea specifically are limited. However, black tea is a source of caffeine for which multiple reactions are reported.
- Caffeine is a stimulant of the central nervous system and may cause insomnia in adults, children, and infants (including nursing infants of mothers taking caffeine). Caffeine acts on the kidneys as a diuretic (increasing urine and urine sodium/potassium levels and potentially decreasing blood sodium/potassium levels) and may worsen incontinence. Caffeine-containing beverages may increase the production of stomach acid and may worsen ulcer symptoms. Tannin in tea can cause constipation. Caffeine in certain doses can increase heart rate and blood pressure, although people who consume caffeine regularly do not seem to experience these effects in the long-term.
- An increase in blood sugar levels may occur after drinking black tea containing high levels of caffeine. Other early studies suggest that green tea may lower blood sugar levels and increase insulin levels. Caffeine-containing beverages such as black tea should be used cautiously in patients with diabetes. People with severe liver disease should use caffeine cautiously, as levels of caffeine in the blood may build up and last longer. Skin rashes have been associated with caffeine ingestion. In laboratory and animal studies, caffeine has been found to affect blood clotting, although effects in humans are not known. It is unclear whether black tea with or without caffeine would have similar effects. Black tea may stain teeth.
- **Caffeine toxicity/high doses**: High doses of caffeine may cause symptoms of anxiety, delirium, agitation, psychosis, or detrussor instability (unstable bladder). Conception may be delayed in women who consume large amounts of caffeine. Seizure, muscle spasm, life-threatening muscle breakdown (rhabdomyolysis), and life-threatening abnormal heart rhythms have been reported with caffeine overdose. Extremely high doses may be fatal.
- **Caffeine withdrawal**: Chronic use can result in tolerance, psychological dependence, and may be habit-forming. Abrupt discontinuation may result in withdrawal symptoms such as headache, irritation, nervousness, anxiety, tremor, or dizziness. In people with psychiatric disorders such as affective disorder or schizoaffective disorder, caffeine withdrawal may worsen symptoms or cause confusion, disorientation, excitement, restlessness, violent behavior, or mania.
- **Chronic effects**: Several population studies initially suggested a possible association between caffeine use and fibrocystic breast disease, although more recent research has not

found this connection. Limited research reports a possible relationship between caffeine use and multiple sclerosis, although evidence is not definitive in this area. Animal study reports that tannin fractions from tea plants may increase the risk of cancer, although it is not clear that the tannin present in black tea has significant carcinogenic effects in humans.

- Drinking tannin-containing beverages, such as black tea, may contribute to iron deficiency. In infants, black tea has been associated with impaired iron metabolism and microcytic anemia.

Pregnancy and Breastfeeding

- Large amounts of black tea should be used cautiously in pregnant women, as caffeine crosses the placenta and has been associated with spontaneous abortion, intrauterine growth retardation, and low birth weight. Heavy caffeine intake during pregnancy may increase the risk of later developing SIDS (sudden infant death syndrome). Very high doses of caffeine have been associated with birth defects, including limb and palate malformations.
- Caffeine is readily transferred into breast milk. Caffeine ingestion by infants can lead to sleep disturbances/insomnia. Infants nursing from mothers consuming high levels of caffeine daily have been reported to experience tremors and heart rhythm abnormalities. Components present in breast milk may reduce infants' ability to metabolize caffeine, resulting in higher than expected caffeine levels. Tea consumption by infants has been associated with anemia, reductions in iron metabolism, and irritability.

INTERACTIONS

Most herbs and supplements have not been thoroughly tested for interactions with other herbs, supplements, drugs, or foods. The interactions listed below are based on reports in scientific publications, laboratory experiments, or traditional use. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy.

Interactions with Drugs

- Studies of the interactions of black tea with drugs are limited. However, black tea is a source of caffeine, for which multiple interactions have been documented.
- Black tea may increase the effects of drugs that cause the blood vessels to narrow (called vasopressors).
- The combination of caffeine with ephedrine, an ephedra alkaloid, has been implicated in numerous severe or life-threatening cardiovascular events such as very high blood pressure, stroke, or heart attack. This combination is commonly used in over-the-counter weight loss products and may also be associated with other adverse effects, including abnormal heart rhythms, insomnia, anxiety, headache, irritability, poor concentration, blurred vision, and dizziness. Stroke has also been reported after the nasal ingestion of caffeine with amphetamine.
- Caffeine may add to the effects and side effects of other stimulants including nicotine, beta-adrenergic agonists such as albuterol (Ventolin®), or other methylxanthines such as theophylline. Conversely, caffeine can counteract drowsy effects and mental slowness caused by benzodiazepines like lorazepam (Ativan®) or diazepam (Valium®). Phenylpropanolamine and caffeine should not be used together due to reports of numerous potentially serious adverse effects, although forms of phenylpropanolamine taken by mouth have been removed from the U.S. market due to reports of bleeding into the head.
- When taken with caffeine, a number of drugs may increase caffeine blood levels or the length of time caffeine acts on the body, including disulfiram (Antabuse®), oral contraceptives

(OCPs) or hormone replacement therapy (HRT), ciprofloxacin (Cipro®), norfloxacin, fluvoxamine (Luvox®), cimetidine (Tagamet®), verapamil, and mexiletine. Caffeine levels may be lowered by taking dexamethasone (Decadron®). The metabolism of caffeine by the liver may be affected by multiple drugs, although the effects in humans are not clear.

- Caffeine may lengthen the effects of carbamazepine or increase the effects of clozapine (Clozaril®) and dipyridamole. Caffeine may affect serum lithium levels and abrupt cessation of caffeine use by regular caffeine users taking lithium may result in high levels of lithium or lithium toxicity. Levels of aspirin or phenobarbital may be lowered in the body, although clinical effects in humans are not clear.
- Although caffeine by itself does not appear to have pain-relieving properties, it is used in combination with ergotamine tartrate in the treatment of migraine or cluster headaches (for example, Cafergot®). It has been shown to increase the headache relieving effects of other pain relievers such as acetaminophen and aspirin (for example, Excedrin®). Caffeine may also increase the pain relieving effects of codeine or ibuprofen (Advil®, Motrin®).
- As a diuretic, caffeine increases urine and sodium losses through the kidney, and may add to the effects of other diuretics such as furosemide (Lasix®).
- There is controversy as to how black tea and caffeine affect blood clotting. Black tea may contain vitamin K, which when used in large quantities can reduce the blood thinning effects of warfarin (Coumadin®), a phenomenon that has been reported in a human case. However, black tea may also increase the risk of bleeding when taken with anticoagulants or antiplatelet therapies. Caution is advised.
- Based on preliminary data, theanine, a specific glutamate derivative in green tea (which is the same species as black tea), may reduce the adverse reactions caused to the heart and liver by the prescription cancer drug doxorubicin. Further research is needed to confirm these results.
- Based on preliminary data, ingestion of green tea may lower LDL cholesterol and thus may theoretically interact with other cholesterol-lowering drugs.
- Other potential interactions may include drugs such as adenosine, alcohol, antidiabetics, antipsychotics, fluconazole, hydrocortisone, levodopa, MAOI antidepressants, phenytoin, proton pump inhibitors (PPIs), riluzole, and timolol.

Interactions with Herbs and Dietary Supplements

- Studies of black tea interactions with herbs and supplements are limited. However, black tea is a source of caffeine for which multiple interactions have been documented.
- There is controversy as to how black tea and caffeine affect blood clotting. Caution is advised when using herbs or supplements that affect blood clotting.
- Black tea may increase the effects of herbs or supplements that cause the blood vessels to narrow (called vasoconstrictors).
- Black tea may increase or decrease the effects of antidiabetic agents.
- Caffeine may add to the effects and side effects of other stimulants. The combination of caffeine with ephedrine, which is present in ephedra (ma huang), has been implicated in numerous severe or life-threatening cardiovascular events such as very high blood pressure, stroke, or heart attack. This combination is commonly used in over-the-counter weight loss products and may also be associated with other adverse effects including abnormal heart rhythms, insomnia, anxiety, headache, irritability, poor concentration, blurred vision, and dizziness.

- Cola nut, guarana (*Paullina cupana*), and yerba mate (*Ilex paraguariensis*) are also sources of caffeine and may add to the effects and side effects of caffeine in black tea. A combination product containing caffeine, yerba mate (*Ilex paraguariensis*), and damiana (*Turnera difussa*) has been reported to cause weight loss, slowing of the gastrointestinal tract, and a feeling of stomach fullness.
- As a diuretic, caffeine increases urine and sodium losses through the kidney and may add to the effects of other diuretic agents.
- Based on preliminary data, ingestion of black tea may lower LDL cholesterol, and thus may theoretically interact with other cholesterol-lowering herbs and supplements.
- Bitter orange, calcium, iron, MAOIs, and tannin-containing herbs and supplements may also interact.
- Black tea may increase the effects of antioxidants.

AUTHOR INFORMATION

- This information is based on a systematic review of scientific literature edited and peer-reviewed by contributors to the Natural Standard Research Collaboration (www.naturalstandard.com).

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Natural Standard developed the above evidence-based information based on a thorough systematic review of the available scientific articles. For comprehensive information about alternative and complementary therapies on the professional level, go to www.naturalstandard.com. Selected references are listed below.

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