

## BLACK TEA

<b>Scientific and Common Names</b>	<ul style="list-style-type: none"><li>▪ Also known as Black Leaf Tea, Chinese Tea<sup>1</sup>.</li><li>▪ <i>Scientific Names:</i> Camellia sinensis, Camellia theifera, Thea Bohea, Thea sinensis, Thea viridis<sup>1</sup>.</li><li>▪ May be classified according to country of origin (China, Ceylon, Indonesian, Rwandan, etc.) or district of origin (Assam, Enshu, Dimbula, etc.) or the grade/size of the processed leaf (flowery pekoe, souchong, etc.) by manufacturing process (“fermented”, “non-fermented”, “semi-fermented”)<sup>2</sup>.</li></ul>
<b>Active Ingredients</b>	<ul style="list-style-type: none"><li>▪ Polyphenols, especially tannins; mainly catechol tannins (ie. (-) epicatechol, 4-gallocatechol, and others)<sup>2</sup>.</li><li>▪ Theaflavins which include theaflavin-3-gallate, theaflavin-3'-gallate, and theaflavin -3,3'-digallate<sup>3</sup>.</li><li>▪ Theanine (5-ethylamide of glutamic acid) is a characteristic component of the amino acid spectrum of tea; used to assess the quality of the tea<sup>2</sup>.</li><li>▪ Flavenoids including the apigenin derivatives isoschaftoside and vicenin-3<sup>2</sup>.</li><li>▪ Hydroperoxide lyases, which are antioxidant enzymes that are potent inhibitors of lipoxygenase<sup>2</sup>.</li><li>▪ Caffeine up to 4%, together with small amounts of theophylline and theobromine and traces of xanthine and adenine<sup>2</sup>.</li></ul>
<b>Mechanism of Action</b>	<ul style="list-style-type: none"><li>▪ The leaf and stem are the important parts of the plant. Flavonoids are thought to possess antioxidant effects. Several polyphenolic substances in black tea have been shown to have antioxidant properties<sup>1</sup>.</li><li>▪ It is not known how black tea prevents heart disease. Possibly, black tea may be beneficial in atherosclerosis because the flavonoids might reduce lipoprotein oxidation<sup>1</sup>. Black tea may reduce cardiovascular risk via improved vasodilator function arteries<sup>3</sup>. Short and long-term black tea consumption reverses endothelial vasomotor dysfunction in patients with coronary artery disease, which may partly explain the association between tea consumption and decreased cardiovascular events<sup>4</sup>.</li><li>▪ For osteoporosis, it is thought that isoflavonoids have weak estrogenic effects that might benefit post-menopausal women with decreased estrogen levels<sup>1</sup>.</li><li>▪ The caffeine in black tea acts as a CNS stimulant and is thought to improve cognitive performance<sup>1</sup>.</li><li>▪ The tannin constituents cause anti-diarrheal effects<sup>1</sup>.</li><li>▪ For Parkinson’s disease, the caffeine in black tea may prevent adenosine’s inhibition of dopaminergic transmission that might result in a reduction in the clinical expression of Parkinsonism<sup>1</sup>.</li></ul>
<b>Indications and Efficacy</b>	<ul style="list-style-type: none"><li>▪ Improving cognitive performance—moderate doses of the caffeine component in black tea improves cognitive performance by stimulating the sympathetic nervous system. Ingestion of tea is associated with rapid increases of alertness and performance<sup>6</sup>.</li><li>▪ Decreases risk of cancer—by modulation of signal transduction pathways that lead to inhibition of cell proliferation and transformation, induction of apoptosis of pre-neoplastic and neoplastic cells, as well as inhibition of tumor invasion and angiogenesis<sup>7</sup>.</li><li>▪ Decreases risk of atherosclerosis, myocardial infarction—regular ingestion of black tea improves brachial artery vasodilation by significantly increasing endothelium-dependent dilatation and increasing endothelium-independent dilatation. Black tea may reduce cardiovascular risk via improved vasodilator function of conduit arteries<sup>4</sup>. In patients with coronary artery disease, short and long-term consumption of black tea reverses endothelial vasomotor dysfunction<sup>5</sup>.</li></ul>

	<ul style="list-style-type: none"> <li>▪ Prevention of Parkinson’s disease—neuroprotection was due to the potent antioxidant and iron-chelating actions of the polyphenolic constituents of tea extracts, preventing nuclear translocation and activation of cell death promoting NF-<math>\kappa</math>B<sup>8</sup>.</li> <li>▪ Prevention of dental caries—various components of black tea work to prevent cavities by inhibiting salivary amylase and glucosyl transferase; also prevents the adherence of <i>S. mutans</i>. In addition, rinsing the mouth with tea inhibits the breakdown of starch on food particles trapped in the mouth, producing an anti-plaque effect<sup>9</sup>.</li> <li>▪ Used to help decrease headache<sup>1</sup>.</li> <li>▪ Also used for stomach disorders, vomiting, diarrhea, prevention of kidney stones, acts as a diuretic<sup>1</sup> (<i>not able to find literature for these indications</i>).</li> </ul>
<b>Dosage Forms/ Recommended Doses<sup>1</sup></b>	<ul style="list-style-type: none"> <li>▪ Drink several cups/day for stimulant effects.</li> <li>▪ For anti-diarrheal effects, drink 1 cup BID-TID.</li> <li>▪ To reduce the risk of heart attack and to improve cognitive function, drink 1 cup/day.</li> <li>▪ For preventing atherosclerosis, drink 1-4 cups per day.</li> <li>▪ To prevent Parkinson’s disease, men who drink 5-33 cups/day have the lowest risk of developing Parkinson’s disease, but also risk decreases when drinking as little as 1-3 cups/day. For women, moderate caffeine consumption (1-4 cups/day) appears to be more beneficial.</li> </ul>
<b>Drug Interactions<sup>1</sup></b>	<ol style="list-style-type: none"> <li>1) Acetaminophen → can increase the effectiveness of APAP due to the caffeine content</li> <li>2) Antipsychotics → theoretically, the caffeine might decrease absorption of fluphenazine or haloperidol</li> <li>3) Aspirin, barbiturates → might decrease the caffeine effects in black tea</li> <li>4) Benzodiazepines → the caffeine might decrease the sedative effects</li> <li>5) <math>\beta</math>-Agonists → the caffeine can increase the cardiac inotropic effects of these drugs</li> <li>6) <math>\beta</math>-blockers → concomitant use of propranolol or metoprolol can increase blood pressure by interacting the caffeine</li> <li>7) Cimetidine → cimetidine interacts with caffeine and decreases caffeine clearance by 30-50%</li> <li>8) Clozapine → might interact with caffeine and cause acute exacerbation of psychotic symptoms; can increase effects and toxicity of clozapine; caffeine doses of 400-1000mg/day inhibits clozapine metabolism</li> <li>9) CNS depressants → concomitant use can increase the toxic effects of caffeine</li> <li>10) Disulfiram → can decrease clearance and increase the half-life of caffeine, increasing effects and risk of adverse effects.</li> <li>11) Ergotamine → the caffeine can increase GI absorption of ergotamine</li> <li>12) Lithium → abrupt withdrawal of caffeine can increase serum lithium levels, worsening tremor</li> <li>13) MAO inhibitors → intake of large amounts of caffeine can cause a hypertensive crisis</li> <li>14) Oral contraceptives → concomitant use can interact with the caffeine and can decrease caffeine clearance</li> <li>15) Phenytoin → concomitant use can enhance metabolism and excretion of caffeine</li> <li>16) Quinolones → can decrease caffeine clearance and increase risk of adverse effects.</li> <li>17) Theophylline → the caffeine can increase theophylline levels</li> <li>18) Tricyclics → concomitant use might decrease absorption of amitriptyline or imipramine through interaction with caffeine.</li> <li>19) Verapamil → concomitant use can increase caffeine levels, increasing the risk of adverse effects.</li> </ol>

<b>Drug-disease Interactions<sup>1</sup></b>	<ol style="list-style-type: none"> <li>1) Depression, anxiety disorders: the caffeine can aggravate these conditions.</li> <li>2) Gastric, duodenal ulcers: the caffeine can aggravate these conditions.</li> <li>3) Heart conditions: the caffeine can induce cardiac arrhythmias in sensitive individuals.</li> <li>4) Hormone-sensitive cancers and conditions: because black tea might have weak estrogenic effects, women with hormone-sensitive conditions should avoid high doses of the tea (i.e. breast, uterine, ovarian cancers).</li> <li>5) Hypertension: the caffeine might increase blood pressure but is not common.</li> <li>6) Kidney disease: the diuretic effect of caffeine might aggravate the kidney.</li> </ol>
<b>Contraindications, Allergies</b>	None listed.
<b>Other Safety Issues<sup>1</sup></b>	<p>Likely safe, when used in moderate amounts. Possibly unsafe when used in large amounts since black tea contains a significant amount of caffeine. Consumption of more than 5 cups/day (&gt;300mg of caffeine) is associated with the occurrence of adverse events. Black tea should not be given to children due to the likelihood of impaired iron metabolism and microcytic anemia since tannins present in the tea will bind and prevent GI absorption of iron. Possibly safe during pregnancy and lactation when used in moderate amounts. A significant amount of caffeine crosses the placenta and may affect the fetus; in high amounts, there is some evidence of the caffeine leading to premature delivery, low birth weight, and possibly death of the fetus. During lactation, ingestion of black tea is possibly unsafe since it might cause irritability and increased bowel activity for the nursing infant.</p>
<b>Other Comments<sup>2</sup></b>	<p><b>TO PREPARE</b>—pour boiling water over a teaspoon of tea; cover and allow to draw for 2-10 minutes depending on use, then strain. As a stimulant, the tea should be allowed to steep for 2 minutes. For stimulant purposes, the tea should be allowed to steep for a short amount of time, as caffeine dissolves in hot water. For antidiarrhoeic purposes, allow the tea to draw for 10 minutes. During a longer extraction time, the concentration of tannins increases enhancing the antidiarrhoeic action.</p>
<p><b>REFERENCES</b></p> <p><sup>1</sup> Therapeutic Research Faculty (US). Natural Medicines Comprehensive Database. 5<sup>th</sup> edition. California: Pharmacist's Letter; 2003. p. 182-85.</p> <p><sup>2</sup> Wichtl M. Herbal Drugs and Phytopharmaceuticals. London: CRC Press, MedPharm Scientific Publishers; 1994. p. 490-2.</p> <p><sup>3</sup> Ebadi M. Pharmacodynamic Basis of Herbal Medicine. New York: CRC Press; 2002. p. 435-8.</p> <p><sup>4</sup> Hodgson JM, Puddey IB, Burke V, Watts GF, Beilin LJ. Regular ingestion of black tea improves brachial artery vasodilator function. Clin Sci 2002; 102(2): 195-201.</p> <p><sup>5</sup> Duffy SJ, Keaney JF, Holbrook M, Gokce N, Swerdloff PL, Frei B, Vita JA. Short- and long-term black tea consumption reverses endothelial dysfunction in patients with coronary artery disease. Circ 2001; 104(2):151-6.</p> <p><sup>6</sup> Hindmarch I, Quinlan PT, Moore KL, Parkin C. The effects of black tea and other beverages on aspects of cognition and psychomotor performance. Psychopharmacology 1998; 139:230-8.</p> <p><sup>7</sup> Yang CS, Maliakal P, Meng P. Inhibition of carcinogenesis by tea. Ann Rev of Pharmacology and Toxicology 2002; 42:25-54.</p> <p><sup>8</sup> Levites Y, Youdim M, Maor G, Mandel S. Attenuation of 6-hydroxydopamine (6-OHDA)-induced nuclear factor-kappaB (NF-κB) activation and cell death by tea extracts in neuronal cultures. Biochem Pharmacology 2002; 63:21-29.</p> <p><sup>9</sup> Hamilton-Miller JMT. Anti-cariogenic properties of tea. J of Medical Microbiology 2001; 50(4):299-302.</p>	