



Theanine



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Scientific Name

5-N-ethylglutamine.

Background

Theanine is a major nonprotein amino acid found in green tea ([1463](#), [91743](#), [91748](#)). It contributes to the sweet umami taste of green tea ([91745](#)). Theanine is also found in some mushrooms ([12188](#)). Structurally, theanine is similar to glutamic acid ([91748](#)).

Also known as: 2-Amino-4- (ethylcarbamoyl) Butyric Acid, Gamma-glutamylethylamide, L-Theanine, L-Théanine, N-Éthyl-L-Glutamine, Teanina, Théanine.

CAUTION: See separate listings for Green Tea and Threonine.

[+ History](#)

People Use This For

Orally, theanine is used for reducing anxiety and stress, preventing Alzheimer's disease, treating attention deficit-hyperactivity disorder (ADHD), and improving cognitive performance and sustained attention. It is also used for hypertension, preventing influenza, and enhancing the effects of chemotherapy drugs.

Safety

POSSIBLY SAFE ...when used orally, short-term. There is some evidence that theanine up to 250 mg can be safely used when given once a week for 3 weeks ([12188](#), [36439](#)). Also, some evidence shows that a combination of catechin 378 mg and theanine 210 mg can be used safely when taken once daily for up to 5 months ([54021](#)). There is insufficient reliable information about the safety of theanine when used long-term.

CHILDREN: **POSSIBLY SAFE** ...when used orally, short-term. A specific theanine product (Suntheanine, Taiyo Kagaku) 200 mg twice daily has been used safely in boys aged 8-12 years for up to 6 weeks ([91744](#)).

PREGNANCY AND LACTATION: Insufficient reliable information available; avoid using.

Effectiveness

[See detailed evidence summary](#)

POSSIBLY EFFECTIVE

Cognitive performance. Preliminary clinical research shows that taking theanine 100 mg prior to cognitive testing reduces the rate of errors compared with placebo in healthy adults ([91747](#)).

There is conflicting evidence regarding the effects of theanine on cognitive performance when taken in combination with caffeine. Some preliminary research shows that the combination improves alertness and cognitive performance and reduces task-induced fatigue compared with placebo ([38116](#)). However, other preliminary research shows that taking theanine along with caffeine does not improve cognitive performance compared to either individual ingredient ([91747](#)). Furthermore, additional research shows that taking theanine along with caffeine can decrease cognitive performance compared to taking caffeine alone ([91748](#)). However, best evidence to date, which comes from a meta-analysis of 10 trials, suggests that taking theanine along with caffeine does not improve reaction time but does improve accuracy during a test evaluating a person's ability to switch attention between different tasks. The combination also appears to improve alertness. The benefits do not appear to be dose-dependent ([91750](#)).

INSUFFICIENT RELIABLE EVIDENCE to RATE

Attention deficit-hyperactivity disorder (ADHD). Preliminary clinical research shows that taking a specific theanine product (Suntheanine, Taiyo Kagaku) 200 mg by mouth twice daily for 6 weeks increases in the percent of time spent in restful sleep by about 5% and decreases the number of bouts of nocturnal activity by about 6 compared to placebo in boys ages 8-12 with a diagnosis of ADHD ([91744](#)).

Influenza. Preliminary clinical research suggests that taking a combination of green tea catechins (THEA-FLAN 90S, Ito-en Co.) 378 mg standardized to contain 270 mg of epigallocatechin gallate plus theanine (Suntheanine, Taiyo Kagaku) 210 mg daily for 5 months reduces the risk of developing clinically defined influenza compared with placebo. However, the combination does not seem to prevent laboratory-confirmed influenza infection ([54021](#)).

Stress. There is conflicting evidence regarding the efficacy of theanine for treating experimentally induced stress. One clinical study shows that taking L-theanine (Taiyo Kagaku) 200 mg prior to a psychological exam reduces tension-anxiety and may prevent blood pressure increases caused by psychological stress (91746). Other preliminary clinical research shows that taking theanine 200 mg twice daily for one week prior to and for the first 10 days of a pharmacy practice period decreases subjective stress scores compared to placebo in pharmacy students (91745). However, another preliminary clinical study shows that taking a specific theanine product (Suntheanine, Taiyo Kagaku) 200 mg induces subjective feelings of tranquility in relaxed people but not those with experimentally induced anticipatory anxiety (12188). Reasons for the discrepancy are not clear but may relate to the stress response level of the included participants.

Dosing & Administration

- **Adult**

Oral:

Cognitive performance: A single dose of theanine 100 mg prior to cognitive testing has been used (91747). Theanine has also been used in combination with caffeine. Combination doses used ranged from 30-100 mg of caffeine and 12-100 mg of theanine (38116, 91750).

Influenza: Six capsules of a supplement containing green tea catechins (THEA-FLAN 90S, Ito-en Co.) 378 mg standardized to 270 mg of epigallocatechin gallate plus theanine (Suntheanine, Taiyo Kagaku) 210 mg, taken daily for 5 months during influenza season, has been used (54021).

Stress: A single dose of theanine (Taiyo Kagaku) 200 mg prior to a stress-inducing exam has been used (91746). Also, theanine 200 mg twice daily for one week prior to and for the first 10 days of a pharmacy practice period has been used (91745).

- **Children**

Oral:

Attention deficit-hyperactivity disorder (ADHD): A specific theanine product (Suntheanine, Taiyo Kagaku) 200 mg twice daily for 6 weeks has been used in boys aged 8-12 years (91744).

- **Standardization & Formulation**

Theanine can be prepared by one of three methods: isolation from tea leaves, chemical synthesis, or biosynthesis. Due to the high cost and low yield of theanine from tea leaf extraction, this method is less commonly used in commercial settings. Chemical synthesis of theanine is high yielding and may be cost effective, but supplements prepared by chemical synthesis often contain a racemic mixture of both L-theanine and D-theanine. It is not known if D-theanine has the same effects as L-theanine. Due to the limitations with extraction or chemical synthesis of theanine, biosynthesis has the strongest potential for producing theanine for dietary supplements. One specific theanine product (Suntheanine, Taiyo Kagaku) is prepared from ethylamine and glutamic acid using a specific biosynthetic strategy (94128).

Adverse Effects

[Report an Adverse Reaction to Theanine](#)

General: Orally, theanine is generally well tolerated. Some clinical research shows that it may increase headaches during cognitive testing. Also, one case of subtle facial tics has been reported for a pediatric patient after taking theanine for 4 days. However, it is unlikely that this adverse event is associated with theanine.

[+ Neurologic/CNS](#)

Toxicology

Animal research shows that the no-observed-adverse-effect-level (NOAEL) of theanine is ≥ 4000 mg/kg body weight in male and female

Interactions with Drugs

ANTIHYPERTENSIVE DRUGS

Interaction Rating = Moderate Be cautious with this combination.

Severity = Moderate • Occurrence = Possible • Level of Evidence = D

Evidence from animal research suggests that theanine can lower blood pressure in spontaneously hypertensive animals (7687, 77354). Theoretically, concomitant use of theanine and antihypertensive drugs might potentiate the activity of antihypertensive drugs.

Some antihypertensive drugs include captopril (Capoten), enalapril (Vasotec), losartan (Cozaar), valsartan (Diovan), diltiazem (Cardizem), Amlodipine (Norvasc), hydrochlorothiazide (HydroDiuril), furosemide (Lasix), and many others.

STIMULANT DRUGS

Interaction Rating = Moderate Be cautious with this combination.

Severity = Moderate • Occurrence = Possible • Level of Evidence = D

Animal research suggests that concomitant use of theanine and stimulant drugs might decrease the effects of stimulant drugs (7685, 7686).

Some stimulant drugs include diethylpropion (Tenuate), epinephrine, phentermine (Ionamin), pseudoephedrine (Sudafed), and many others.

Interactions with Herbs & Supplements

CAFFEINE-CONTAINING HERBS AND SUPPLEMENTS: Preliminary evidence from animal research shows that theanine can inhibit the stimulant effects produced by caffeine (8665). Theoretically, theanine may reduce the effects of caffeine and caffeine-containing herbs and supplements. Some herbs and supplements that contain caffeine include coffee, black tea, oolong tea, guarana, mate, cola, and others.

HERBS AND SUPPLEMENTS WITH HYPOTENSIVE EFFECTS: Animal research shows that theanine can lower blood pressure (7687, 77354). Theoretically, combining theanine with other herbs or supplements with hypotensive effects might increase the risk of hypotension. Some of these herbs and supplements include andrographis, casein peptides, cat's claw, coenzyme Q10, fish oil, L-arginine, lycium, stinging nettle, and others.

Interactions with Foods

None known.

Interactions with Lab Tests

None known.

Interactions with Diseases

HYPOTENSION: Theanine might lower blood pressure (7687, 77354). Theoretically, theanine might increase the risk of hypotension in people prone to low blood pressure. However, this effect has not been reported in humans.

Mechanism of Action

General: Theanine is the major amino acid found in green tea. Green tea contains 1% to 3% theanine (7685, 7690). Theanine is also found in some mushrooms (12188).

Anticancer effects: There is also interest in using theanine adjunctively for cancer. In studies involving doxorubicin, theanine increases the concentration of doxorubicin and adriamycin in tumors by blocking efflux of the drug from tumor cells (7688, 7690, 8668, 8669). Theanine also appears to increase the concentration of doxorubicin in tumor cells by inhibiting glutamate transporters (77323, 77330). Theanine seems to enhance the effects of doxorubicin and adriamycin on drug sensitive and multi-drug resistant tumors (7688, 8668, 8669). Theanine may also enhance the suppressive action of doxorubicin on metastatic tumors (8312). Animal research also shows that theanine decreases doxorubicin-induced toxicity related to oxidative damage by increasing glutamate concentrations (53718).

Animal research shows that theanine inhibits the efflux of pirarubicin from ovarian cancer cells (77321). Similarly, theanine inhibits the efflux of idarubicin from leukemia cells in animal models (7689). Additionally, theanine seems to decrease the toxicity of idarubicin by reversing adverse effects on leukocytes and bone marrow cells (7689).

Anti-inflammatory effects: Preliminary clinical research shows that administering theanine along with cysteine perioperatively decrease biomarkers of inflammation after surgery. It is thought that the combination of theanine and cysteine reduces blood levels of interleukin (IL)-6 following surgery by preventing decreases in glutathione levels (91742).

Cardiovascular effects: There is also interest in using theanine for hypertension. Theanine affects catecholamines that can cause vasoconstriction and lead to elevations in blood pressure. However, in animal models, theanine decreases norepinephrine levels (7686, 77339), which decreases systolic and diastolic blood pressure (7687, 8670, 77354). Also, some research shows that theanine suppresses the stimulatory effects of caffeine (7685, 8665, 36435). However, other studies have not demonstrated this antagonistic effect (38116, 91748). Also, there is some evidence theanine might induce an excitatory effect when used in very small doses, suggesting that the effects of theanine are dose dependent (8665).

Green tea, which contains theanine, might prevent atherosclerosis by inhibiting the proliferation of smooth muscle cells in blood vessel walls. However, theanine doesn't seem to affect smooth muscle (8666). There is evidence to suggest theanine might prevent the development of atherosclerosis by inhibiting lipid peroxidation of low-density lipoproteins (LDL) (8667).

Immunostimulant effects: In vitro research shows that theanine may help the body's immune system response when fighting infection by boosting the disease-fighting capacity of gamma-delta T cells (54021, 77329).

Neurological/CNS effects: Theanine has historically been used for its relaxing and anti-anxiety effects. It's thought that theanine might work for anxiety by increasing levels of GABA and serotonin (12188, 36439, 91750). Theanine is also thought to work for stress-induced anxiety by reducing the release of glutamate, an excitatory neurotransmitter (91745).

There is interest in using theanine for dementia. Levels of glutamate increase and cause neuronal death during periods of cerebral

ischemia. Theanine demonstrates a protective effect by decreasing ischemic neuronal death in the forebrains of animal models (7685, 77342). The antagonistic effects of theanine on glutamate and N-methyl-D-aspartate (NMDA) receptors might provide neuroprotection (7685, 77328).

There is also some evidence that theanine might decrease serotonin and 5-hydroxyindole acetic acid (5HIAA) concentrations in the brain. Theanine might enhance the degradation of serotonin, and it might also directly inhibit the enzyme responsible for serotonin synthesis (7687, 8670, 77354).

Weight loss effects: Animal research suggests theanine may act synergistically with caffeine and other constituents in green tea to cause weight loss (11960).

Pharmacokinetics

Absorption: Theanine is absorbed through the intestines (77320, 77326). The peak concentration of theanine in the plasma occurs at about 50 minutes post-consumption (91743, 91747). The absorption of theanine occurs similarly from theanine supplements and green tea (91743).

Distribution: Following absorption, theanine is distributed to the plasma and erythrocytes (91743).

Metabolism: Theanine is hydrolyzed to ethylamine and glutamic acid (91743). The elimination half-life of theanine from plasma ranges from 0.8-1.2 hours (91743).

Excretion: A small amount of theanine is retained in erythrocytes, but most theanine and its metabolites are excreted in the urine between 3 and 24 hours post-consumption (91743). Only about 2.4% to 3.1% of ingested theanine is excreted unmetabolized; most ingested theanine is excreted as ethylamine and glutamic acid (91743).

Evidence Table / Discussion

[See detailed Evidence Summary](#)

References

[See Monograph References](#)

This monograph was last reviewed on 9/15/2016 and last updated on 4/10/2017. Monographs are reviewed at least once per year. If you have comments or suggestions on something that should be reviewed or included, please [tell the editors](#). For details about our evidence-based approach, see our [Editorial Principles and Process](#).
