L-THEANINE (*γ-glutamylethylamide)*

COMMON INDICATIONS:

- Stress & Anxiety Relief
- Sleep support, GABA
- Support mental focus & concentration
- Cancer benefits
- Hypertension

GENERAL COMMENTS:

Tea is the second most consumed beverage in the world and in 1949, it was discovered that the tea plant (Camellia sinensis) almost exclusively contains a unique amino acid known as L-theanine. It also appears to occur in three other species; one mushroom species (Boteus badius) and two other species of the Camellia genus.

Theanine is synthesized in the root of the plant and concentrates in the leaves, where sunlight converts theanine to polyphenols. Theanine is thought to greatly contribute to the taste of green tea. Theanine represents roughly 50% of the amino acids in tea, and is present as a free amino acid, thus not a part of any protein.

BENEFITS &MECHANISM OF ACTION:

Stress and Anxiety Relief

For generations, many cultures have consumed tea for its relaxing effects. It is thought that theanine actually decreases the stimulant effects of caffeine. Theanine crosses the blood brain barrier by way of the large neutral amino acid (leucine-preferring) transport system where it is thought to increase both serotonin and dopamine production. Although one study showed a decrease in serotonin in rats administered theanine, human electroencephalograph (EEG) studies have shown that Theanine increases alpha-brain wave activity, a sign of induced relaxation without induced drowsiness. In addition, alpha activity is known to impact attention and research has indicated that theanine has a positive impact on alertness. Theanine may also act as a glutamate antagonist. In people who are depressed, glutamate levels are out of balance. Glutamate-activated signals not only affect mood, they affect memory and learning.

Cancer Treatment

Theanine has been studied extensively for its effects on tumor cells and the sensitivity of those cells to chemotherapeutic agents. It appears theanine competitively inhibits glutamate transport

into tumor cells, which causes decreased intracellular glutathione (GSH) levels. Theanine also inhibits the efflux of chemotherapeutic agents, such as doxorubicin, idarubicin, cisplatin, and irinotecan, causing them to accumulate in tumor cells. Theanine also protects normal cells from damage by these drugs via antioxidant activity, specifically by maintaining cellular GSH levels.

Blood Pressure Reduction

In previous studies conducted in spontaneously hypertensive rats, theanine was shown to significantly lower blood pressure.[15] In another randomised, double-blind, placebo-controlled study, conducted in healthy adult participants, theanine was shown to decrease blood pressure as well as antagonized the effects of caffeine on blood pressure.[14]

Other

The antioxidant activity of L-theanine has been studied in regard to its effect on the oxidation of LDL cholesterol. In vitro testing using malondialdehyde as a marker of lipid peroxidation demonstrated inhibition of LDL oxidation with theanine, although the effect was weaker than the potent antioxidant effect of green tea polyphenols.

Green tea catechins along with Theanine were shown in clinical study to be effective prophylaxis for influenza virus.[16]

Theanine decreased anxiety and general psychopathology in schizophrenic patients.[7]

Theanine along with caffeine may increase alertness and cognitive performance.[1]

DOSE:

- Anxiety or Relaxation: 100-200 mg of a standardized extract one to three times daily.
- For Cancer: there is no recommended dose; however, a dose of 400-800 mg three times daily may be used safely.

STANDARDIZATION:

- Green tea is the best source of theanine. Only the L-theanine isomer should be used, as D-theanine and mixed isomers have been reported to have lower bioavailability than pure theanine.

CAUTIONS & SIDE EFFECTS:

- No side effects or toxicity have been reported with theanine.
- Theanine may increase the activity of chemotherapy drugs (including doxorubicin, idarubicin, pirarubicin, cisplatin, and irinotecan) in tumor cells.

References:

STRESS & ANXIETY RELEIF

1. Giesbrecht T, Rycroft JA, Rowson MJ, et al. The combination of L-theanine and caffeine improves cognitive performance and increases subjective alertness. Nutr Neurosci. 2010;13(6):283-90.

2. Ito K, Nagato Y, Aoi N, et al. Effects of Ltheanine on the release of alpha-brain waves in human volunteers. Nippon Nogeikagaku Kaishi. 1998;72:153-157.

3. Juneja LR, Chu D, Okubo T, et al. L-theanine – a unique amino acid of green tea and its relaxation effect in humans. Food Sci Tech. 1999;10:199-204.

4. Kakuda T, Nozawa A, Unno T, et al. Inhibiting effects of theanine on caffeine stimulation evaluated by EEG in the rat. Biosci Biotechnol Biochem. 2000;64:287-293.

5. Nobre AC, Rao A, Owen GN. L-theanine, a natural constituent in tea, and its effect on mental state. Asia Pac J Clin Nutr. 2008;17 Suppl 1:167-8.

6. Owen GN, Parnell H, De Bruin EA, Rycroft JA. The combined effects of L-theanine and caffeine on cognitive performance and mood. Nutr Neurosci. 2008 Aug;11(4):193-8.

7. Ritsner MS, Miodownik C, Rahter Y, et al. L-theanine relieves positive, activation, and anxiety symptoms in patients with schizophrenia and schizoaffective disorder: an 8-week, randomized, double-blind, placebo- controlled, 2-center study. J Clin Psychiatry. 2011;72(1):34-42.

8. Yokogoshi H, Mochizuki M, Saitoh K. Theanineinduced reduction of brain serotonin concentration in rats. Biosci Biotechnol Biochem. 1998;62:816-817.

CANCER

9. Sadzuka Y, Sugiyama T, Miyagishima A, et al. The effects of theanine, as a novel biochemical modulator, on the antitumor activity of adriamycin. Cancer Lett. 1996;105:203-209.

10. Sadzuka Y, Sugiyama T, Suzuki T, Sonobe T. Enhancement of the activity of doxorubicin by inhibition of glutamate transporter. Toxicol Lett. 2001;123:159-167.

11. Sugiyama T, Sadzuka Y, Nagasawa R, et al. Membrane transport and antitumor activity of pirarubicin, and comparison with those of doxorubicin. Jpn J Cancer Res. 1999;90:775-780.

12. Sugiyama T, Sadzuka Y. Combination of theanine with doxorubicin inhibits hepatic metastasis of M5076 ovarian sarcoma. Clin Cancer Res. 1999;5:413-416.

13. Sugiyama T, Sadzuka Y. Theanine, a specific glutamate derivative in green tea, reduces the adverse reactions of doxorubicin by changing the glutathione level. Cancer Lett. 2004;212:177-184.

BLOOD PRESSURE

14. Rogers P.J., Smith J.E., Heatherley S.V., Pleydell-Pearce C. Time for tea: Mood, blood pressure

and cognitive performance effects of caffeine and theanine administered alone and together. Psychopharmacology. 2008;195:569–577. doi: 10.1007/s00213-007-0938-1.

15. Yokogoshi H., Kato Y., Sagesaka Y.M., Takihara-Matsuura T., Kakuda T., Takeuchi N. Reduction effect of theanine on blood pressure and brain 5-hydroxyindoles in spontaneously hypertensive rats. Biosci Biotechnol Biochem. 1995;59:615–618.

OTHER

16. Matsumoto K, Yamada H, Takuma N, et al. Effects of green tea catechins and theanine on preventing influenza infection among healthcare workers: a randomized controlled trial. BMC Complement Altern Med. 2011;11:15.

17. Yokozawa T, Dong E. Influence of green tea and its three major components upon lowdensity lipoprotein oxidation. Exp Toxicol Pathol. 1997;49:329-335.