



# L-Theanine

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Stress and anxiety are not new. Even our distant ancestors had stress. For example, if a saber-tooth tiger came too close for comfort, our ancestors' sympathetic nervous system would respond by increasing the rate and force of heart contractions, dilating bronchial tubes, dilating pupil, stimulating sweat, stimulating the production of adrenal hormones, and inhibiting the movement of food through the digestive tract— basically getting them ready to run for their lives. After the danger had past, the parasympathetic nervous system would bring all of these functions back to normal. Luckily, being threatened by saber-tooth tigers was not a daily occurrence, and the parasympathetic response allowed their nervous system time to recover.

Today we may not be chased by saber-tooth tigers, but getting in a traffic jam, rushing to reach deadlines, and other stressful situations will still cause our sympathetic nervous system to react in a similar way. Furthermore, the relative frequency of such stressful situations during the typical day can heavily tax our nervous systems, without allowing adequate time for recovery. The biochemical ramifications of this are decreased immune response (with more frequent illnesses), mood alterations (anxiety, tension), and decreased energy/increased fatigue levels.

When stress rears its ugly head, the amino acid L-theanine may be able to help.

## **L-Theanine's mechanism of action**

Asian cultures have often used teas for relaxation effects. The relaxing effect is, at least in part, caused by the presence of a neurologically active amino acid, L-

theanine (gamma-ethyl-amino-L-glutamic acid). Tea has the reputation of having less caffeine than coffee but it is the L-theanine in the tea that lessens the stimulant effect of caffeine on the human nervous system. In the brain, L-theanine increases both serotonin and dopamine production<sup>1</sup>, and possibly GABA as well.<sup>2</sup>

Evidence from human electroencephalograph (EEG) studies show that it also significantly increases brain activity in the alpha frequency band which indicates that it relaxes the mind without inducing drowsiness. Alpha activity is also known to play an important role in critical aspects of attention. Research indicates that L-theanine has a significant effect on improving mental alertness while promoting relaxation.<sup>3</sup>

## **Human studies on L-theanine**

According to Mason, two small human studies<sup>4</sup> showed that within 30-40 min of consuming 50 or 200 mg of L-theanine there is an increase of alpha wave activity/electrical signals produced by the brain. The perceived relaxation effect in the subjects coincided with the detection of alpha waves. This shows that L-theanine fosters a state of alert relaxation, which is consistent with the fact that anxious people have fewer or smaller alpha waves.

The journal *Human Psychopharmacology Clinical and Experimental* published a double-blind placebo-controlled study<sup>5</sup> in which sixteen healthy volunteers received 200 mg L-theanine, a pharmaceutical anxiolytic or placebo. The results showed that L-theanine induced feelings of tranquility in the volunteers.

The journal *Biological Psychology* published a double-blind, placebo-controlled study<sup>6</sup> in which twelve participants underwent four separate trials: one in which they took L-theanine at the start of an experimental, stress-inducing procedure, one in which they took L-theanine midway, and two control trials in which they either took a placebo or nothing. The results showed that L-theanine intake resulted in a reduction in some physiological indicators of stress within 15 minutes, compared to the placebo or control condition.

Moreover, analyses of heart rate variability indicated that reductions in heart rate were likely attributable to a reduction of sympathetic nervous activation, suggesting that L-theanine had anti-stress effects via the inhibition of cortical neuron excitation.

The *Journal of Functional Foods* published a double-blind, placebo-controlled study<sup>7</sup> in which 18 normal healthy subjects were divided into two groups referred to as high anxiety propensity group and the minimal anxiety propensity group. Both groups received 200 mg L-theanine and placebo (at different times)(200 mg/100 ml water) and placebo (100 ml water) in a double blind repeated measurement design protocol. When tested at 15660 minutes after consumption, results showed significantly enhanced activity of alpha bands, descending heart rate, elevated visual attentional performance, and improved reaction time response among high anxiety propensity subjects compared to a placebo. However, no significant differences were noticed among subjects with a minimal anxiety propensity.

#### Human studies with L-Theanine and caffeine

The journal *Neuropharmacology* published a double-blind, randomized, cross-over study<sup>8</sup> in which 27 participants received 100 mg L-theanine, 50 mg caffeine, a combination of the two, or a placebo. The results were that L-theanine and caffeine significantly reduced error rates during a sustained attention task. It was noted that the combination of L-theanine and caffeine did not confer any additional benefits over either compound alone.

The *Journal of Physiological Anthropology* published a placebo-controlled study<sup>9</sup> in which 14 participants took either L-theanine + placebo, caffeine + placebo, or placebo only (L-theanine 200 mg, caffeine 100 mg) while performing mental task and physiological activities under conditions of physical or psychological stress. The results showed that L-theanine significantly reduced anxiety and reduced the blood-pressure increase in high-stress-response adults. Caffeine tended to have a similar but smaller inhibition of the blood-pressure increases caused by the mental tasks.

#### References

- <sup>1</sup> L-Theanine monograph. *Alternative Medicine Review* 2005;10(2):136-8.
- <sup>2</sup> Lu K, Gray MA, Oliver C, et al. The acute effects of L-theanine in comparison with alprazolam on anticipatory anxiety in humans. *Hum Psychopharmacol Clin Exp* 2004;19:457-665.
- <sup>3</sup> 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.
- <sup>4</sup> Mason, R. 200 mg of Zen. *Alternative & Complementary Therapies* 2001; 7(2):91-95.
- <sup>5</sup> Lu K, Gray MA, Oliver C, et al. The acute effects of L-theanine in comparison with alprazolam on anticipatory anxiety in humans. *Hum Psychopharmacol Clin Exp* 2004;19:457-665.
- <sup>6</sup> Kimura K, Ozeki M, Juneja LR, Ohira H. L-Theanine reduces psychological and physiological stress responses. *Biol Psychol* 2007;74(1):39-45

- <sup>7</sup> Higashiyama A, Htay HH, Ozeki M, Juneja LR, Kapoor MP. Effects of L-theanine on attention and reaction time response. *Journal of Functional Foods*. 2011;3(3):171-178.
- <sup>8</sup> Foxe JJ, Morie KP, Laud PJ, Rowson MJ, de Bruin EA, Kelly SP. Assessing the effects of caffeine and theanine on the maintenance of vigilance during a sustained attention task. *Neuropharmacology*. 2012 Jun;62(7):2320-7.
- <sup>9</sup> Yoto A, Motoki M, Murao S, Yokogoshi H. Effects of L-theanine or caffeine intake on changes in blood pressure under physical and psychological stresses. *J Physiol Anthropol*. 2012 Oct 29;31:28.



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