NEW FROM MOSS NUTRITION – SERENISELECT™

Given the realities of life in modern society in the United States, it should come as no surprise that one of the most popular requests we receive is for products that fit the general descriptor of “stress formulas.” These formulas are generally designed to promote increased levels of calm and relaxation for those who, for various reasons, demonstrate increased levels of psychological stress. Of course, as you probably know, there is no shortage of stress formulas on the market, all of which contain a wide variety of different constituents. When we decided to create our own “stress formula” which we are calling SereniSelect™, we wanted to both find constituents that seemed to work the best based on feedback from you plus keep the product simple from an ingredient standpoint. Based on your feedback plus supportive research that I am about to present, we decided on three constituents for the SereniSelect™ product:

- GABA
- L-theanine
- Holy basil leaf extract

Of these three, I found the most compelling clinical feedback plus the most compelling research on two – L-theanine and holy basil leaf extract. Therefore, what follows is a review of several papers that I feel make it clear why L-theanine and holy basil leaf extract were obvious choices for SereniSelect™.

L-Theanine (Suntheanine®)

To begin this discussion, I wanted to mention that we decided not to use typical, commercial L-theanine but a specific brand of L-theanine called Suntheanine®. Why? As noted in the paper “The effects of L-Theanine (Suntheanine®) on objective sleep quality in boys with attention deficit hyperactivity disorder (ADHD): a randomized, double-blind, placebo-controlled clinical trial” by Lyon et al (Lyon MR et al, Alt Med Rev, Vol. 16, No. 4, pp. 348-354, 2011), unlike green tea that contains only the active form of theanine, L-theanine, the material that is used in supplements undergoes a manufacturing process that yields both the active form (L-theanine) and the inactive form (D-theanine). Before continuing, you may wonder why, since green tea only contains the active form why not produce L-theanine supplements that are extracts of green tea? This point was also addressed by the authors:

“Although L-theanine can be extracted from green tea, the amount of L-theanine in mass produced tea is probably too low to make this commercially viable. Because of this, clinicians should be wary of lower cost products claiming to be composed of L-theanine extracted from tea. It is possible that such products could be composed of a racemic mixture of L- and D-theanine. In an analysis of six commercially available products labeled as L-theanine, five of the six products contained significant amounts of D-theanine. Only Suntheanine contained pure L-theanine enantiomer (>99% L-isomer purity).”

The basics of L-theanine biochemistry and metabolism

To begin this discussion I would like to highlight some key quotes from the paper “L-theanine, unique amino acid of tea, and its metabolism, health effects and safety” by Turkozu and Sanlier (Turkozu D & Sanlier N, Crit Rev Food Sci Nutr, Vol. 57, No. 8, pp. 1681-1687, 2017). First, as was mentioned,
L-theanine, along with many other compounds, is a constituent of green tea:

“The main bioactive components of black and green tea leaves are the flavonols and flavonol-3-ols (catechins) of flavonoids, which compose around 35% of the dry weight of the tea. In addition, flavonol-3-ol derivative theaflavins and thearubigins, phenolic acids such as gallic acid, alkaloids such as methylxanthines (caffeine, etc.), and polyamines such as spermidines and spermines together with nonproteinic amino acids such as gamma-aminobutyric acid (GABA) and L-theanine are the main bioactive components in tea.”

The next quote provides an overview of the key clinical effects of L-theanine:

“Theanine amino acid, which is a nonprotein in the tea, has been proved to have effects especially on relaxing, cognitive performance, emotional state, [and] sleep quality…”

I will explore research on the clinical impact of L-theanine in much more detail later in this monograph.

The next quote I would like to feature discusses the specifics of L-theanine content of tea. This quote, as you will see, explains why, as I stated above, it is impractical to produce L-theanine supplements from tea extracts:

“L-theanine composes almost 50% of the free amino acids in the tea. The amount of L-theanine in the tea composes 1-3% of the dry tea and that amount changes according to a lot of factors such as the geographic area in which the tea is produced, production techniques, tea class, type and time of harvest, etc. Type of the tea is important as well in terms of L-theanine concentration. In general, when comparing Camellia sinensis var. Sinensis and C. sinensis var. Assamica, C. sinensis var. Sinensis has higher levels of L-theanine. In addition, the tea harvested in the early summer has more L-theanine compared to tea harvested in the later period of the summer.”

What are the specifics of L-theanine metabolism? Consider the following:

“L-theanine is a water soluble molecule with 174.20 Da weight and is rapidly absorbed in the intestine after it is taken orally. L-theanine is transported through cotransport with Na+ from the brush border of the intestine. In addition, it is also reported that L-theanine is carried through the methionine carrier transport system through the intestine. The absorbed L-theanine is transported by blood to the major organs of the body, mainly to the brain. Then, it can either be discharged directly by urine or catabolized to glutamic acid and ethylamine through amide hydrolysis in the kidneys, then it is also discharged from the body with urine.”

The timing of various aspects of L-theanine metabolism is as follows:

“L-theanine reaches its maximum concentration in blood from 30 minutes to 2 hours after it is taken. In a study conducted by van der Pijl et al. it was reported that L-theanine reached to maximum plasma concentration (1.0-4.4 mg/L) after 50 minutes. It was stated that serum concentration of L-theanine began to slowly drop within 24 hours.”

Clinical effects of L-theanine

Turkozu and Sanlier then go on to discuss research on the clinical effects of L-theanine.

L-theanine and stress - Certainly the most prominent and most desired impact of L-theanine is reduction of psychological stress. On this aspect of clinical performance the authors state:

“Since antique ages, tea has been thought to have a relaxing effect. It has been found out that L-theanine is also responsible for the relaxing effect of tea. Normally, there are α, β, δ, and θ waves, which determine the mental state, on the surface of the brain. The α wave of the brain is especially thought to be the indicator of relaxation. It is stated that, 40 minutes after orally taking L-theanine (50-200 mg), α waves occur on the occipital and parietal areas of the brain and that causes relaxation without causing a state of sleep. Song et al. found that 200 mg of L-theanine increased the alpha (α) activity in the frontal
and occipital areas 40 minutes after it was taken by individuals with high anxiety levels.

**L-theanine and cognitive performance** – Given its impact on stress and brain waves, it would make sense that L-theanine also has an impact on cognitive performance. On this aspect of the clinical impact, the authors state:

“L-theanine and its positive effects on cognitive performance is one of its most important functions. Because the chemical structure of L-theanine is similar to glutamate it can act as a neurotransmitter related to memory. In a study on rats, it was found that L-theanine modulated the serotonin and dopamine levels and increased learning skills and memory.”

In addition:

“When the linear electrocardiographic records with cognitive task performance were examined, it was found out that L-theanine was the only amino acid that works synergistically with caffeine in increasing the attention process and cognitive performance in humans. There are some mechanisms explaining those effects. First of all, it is stated that L-theanine crosses the blood-brain barrier and shows a cerebroprotective effect. In addition, it shows a preventive effect on neuronal cell death after transient cerebral ischemia.

**Safety of L-theanine** – How safe is L-theanine administration? Turkozu and Sanlier point out:

“Taking high doses of L-theanine with the diet has been reported to be safe. The FDA states that the estimated daily intake of L-theanine with the diet is 628 mg per person and the 90th percentile value of intake is 1284 mg/day per person. So, in 2011 the FDA suggested that daily consumption of L-theanine should not exceed 1200 mg.”

What about toxicity?

“It is stated that L-theanine has not shown toxic effects either in animals or humans.”

Concerning toxic amounts animal research has shown the following:

“In a study that examined the effect of L-theanine depending on dose, L-theanine (Suntheanine) was given to female and male rats in doses of 0, 1500, 3000, or 4000 mg per kilogram body weight for 13 weeks and it was reported that it did not cause any negative effects at pathologic, organ weight, or histopathologic levels.”

**More research on the biochemistry and physiology of L-theanine**

The review paper by Bryan entitled “Psychological effects of dietary components of tea: caffeine and L-theanine” (Bryan J. Nutr Rev, Vol. 66, No. 2, pp. 82-90, 2007) provides more information on the biochemistry and physiology of L-theanine.

“L-theanine is structurally similar to glutamic acid, an excitatory neurotransmitter.”

However, contrary to what you might expect based on its structure, as was noted above, L-theanine actually inhibits neuroexcitatory activity. It does this by regulating glutamate activity:

“Animal studies have found that L-theanine is associated with the following: an increased release and concentration of dopamine; an inhibition of glutamate reuptake and blockade of glutamate receptors in the hippocampus; increases in gamma-aminobutyric acid (GABA – a neurotransmitter associated with the regulation of responses) concentrations; decreases in norepinephrine levels, possibly as a result of increased GABA; and both increases in serotonin in the stratum, hippocampus, and hypothalamus and suppression of the generalized release of serotonin. In addition, some findings suggest that L-theanine might interact with caffeine because L-theanine has been found to decrease serotonin levels that have been artificially elevated by caffeine. Furthermore, L-theanine appears to antagonize the stimulatory effects of caffeine, which may contribute to its effects on lowering blood pressure. Overall, these effects on neurotransmitters suggest that L-theanine may have a regulatory role in the CNS such that it may modulate and perhaps ‘tone down’ CNS responses. These effects on the CNS would predict that L-theanine might have a role in the regulation of anxiety due to effects on serotonin and GABA; the
enhancement of cognitive performance due to increases in monoamines, and the possibility of neuroprotective effects due to antagonistic effects on glutamate.”

More research on the clinical impact of L-theanine

L-theanine (Suntheanine®) and sleep – In the study by Lyon et al discussed in the beginning of this monograph 93 male children aged 8-12 years with a formal diagnosis of ADHD were evaluated. The parameters of the study were as follows:

“Participants were required to take a total of four chewable tablets of L-theanine (two 100-mg tablets in the morning and two 100-mg tablets in the late afternoon after school [total of 400 mg L-theanine]) or placebo daily. All participants were given a sufficient quantity of the product to complete the six-week treatment period.”

What were the results of the study? The authors note:

“Improvements in several objective sleep quality measures were compelling and significant. Actigraph watch data findings indicated that children who had taken L-theanine obtained significantly higher sleep percentage (sleep efficiency) and reduced nocturnal motor activity scores compared to boys in the placebo group. Children who were administered L-theanine also exhibited less wakefulness after sleep onset (WASO) than those receiving the placebo; however, this finding did not reach statistical significance.”

L-theanine and depression – In the study “Effects of chronic L-theanine administration in patients with major depressive disorder: an open-label study” by Hidese et al (Hidese S et al. Acta Neuropsychiatrica, published online ahead of print July 2016) the impact of supplemental L-theanine was considered in patients with major depressive disorder (MDD). The parameters of the study are as follows:

“Subjects were 20 patients with MDD (four males; mean age: 41.0 ± 14.1 years, 16 females; 42.9 ± 12.0 years). L-theanine (250 mg/day) was added to the current medication of each participant for 8 weeks. Symptoms and cognitive functions were assessed at baseline, 4, and 8 weeks after L-theanine administration…”

What were the results of the study? The authors point out:

“...reduced depressive symptoms, anxiety, sleep disturbance, and enhanced cognitive functions were found in patients with MDD after chronic (8-week) L-theanine (250 mg/day) administration. We also found high tolerability of L-theanine.”

As was well demonstrated by the research discussed above, L-theanine supplementation delivers a whole range of positive neurologic, stress-related benefits, which made it a logical choice for inclusion in our SereniSelect™ product.

HOLY BASIL LEAF EXTRACT (OCIMUM SANCTUM/OCIMUM TENUIFLORUM/TULSI)

Holy basil leaf extract (Also known as Tulsi), another major constituent of SereniSelect™, has been examined in several papers. What follows are some highlights from three of these papers. As a general introduction, consider quotes from two of these papers. First, “The clinical efficacy and safety of Tulsi in humans: A systematic review of the literature” by Jamshidi and Cohen (Jamshidi N & Cohen MM, Evidence-Based Complementary and Alternative Medicine, Vol. 2017, published online 2017) states the following:

“Tulsi in Hindi or Tulsi in Sanskrit (holy basil in English) is a highly revered culinary and medicinal aromatic herb from the family Lamiaceae that is indigenous to the Indian subcontinent and been used within Ayurvedic medicine more than 3000 years.”

In addition:

“Three types of tulsi are commonly described. Ocimum tenuiflorum (or Ocimum sanctum L.) includes 2 botanically and phytochemically distinct cultivars that include Rama or Sri tulsi (green leaves) and Krishna or Shyama tulsi (purplish leaves), while Ocimum gratissimum is a third type of
tulsi known as Vana or wild/forest tulsi (dark green leaves).”

In “Efficacy of an extract of *Ocimum tenuiflorum* (OciBest) in the management of general stress: A double-blind, placebo-controlled study” by Saxena et al (Saxena RC et al. Evidence-Based Complementary and Alternative Medicine, Vol. 2012, published online 2012) the following general statement was made about the clinical impact of holy basil:

“*Ocimum tenuiflorum* Linn. (synonym: *Ocimum sanctum*), generally known as Tulsi or Holy Basil, belongs to family lamiaceae. In Ayurveda, *O. tenuiflorum* has been used for adaptogenic/antistress activity. It has been widely reported to possess antipyretic, antiasthmatic, antioxidant, analgesic, and anti-inflammatory properties. *O. sanctum* prevented reduction in the levels of brain catecholamine and monoamine oxidase and increase in dopamine and 5-hydroxytryptamine in rats exposed to swimming and gravitational stress.”

Of all the properties mentioned above, which might be the most important clinically? Jamshidi and Cohen state:

“It is interesting that tulsi has important clinical effects across diverse therapeutic domains, all of which may have inflammation as an underlying factor. The anti-inflammatory effects of tulsi have been previously documented in many in vitro and in vivo studies, and it is likely that tulsi has multiple bioactive secondary metabolites that act alone or synergistically to inhibit inflammatory pathways.”

Of course, as with L-theanine, the primary reason holy basil leaf extract is a constituent of SereniSelect™ is its antistress properties. What follows is a quote from the paper “Tulsi – Ocimum sanctum: A herb for all reasons” by Cohen (Cohen MM. *J Ayurveda Integr Med*, Vol. 5, No. 4, pp. 251-259, 2014) that provides an overview of published research on the antistress properties of holy basil leaf extract:

“The psychotherapeutic properties of tulsi have been explored in various animal experiments that reveal that tulsi has anti-anxiety and anti-depressant properties…”

In addition:

“Animal studies further reveal that tulsi enhances memory and cognitive function and protects against aging-induced memory deficits. Similarly, in human studies, tulsi has been observed to reduce stress, anxiety and depression with a 6-week, randomized, double-blind, placebo-controlled study reporting that tulsi significantly improves general stress scores, sexual and sleep problems and symptoms such as forgetfulness and exhaustion.”

Interestingly, the human study referred to in the above quote is the Saxena et al study I quoted previously. The quote below from that study gives some information as to the relative impact and safety of holy basil leaf extract compared to placebo:

“…the study findings revealed that OciBest, the whole plant extract of *O. tenuiflorum*, was found to be 1.6 times or 39% more effective in the management of stress symptoms in comparison to placebo group and the herbal supplementation was well tolerated by all the patients over the six weeks of the study period.”

**SOME FINAL THOUGHTS ON SERENISELECT™**

As we are all too well aware, sources of psychological stress seem to be at an all-time high. Therefore, it is not surprising that, as I mentioned in the beginning of this monograph, more and more of you are asking if we can provide some assistance in dealing with the current wave of psychological onslaughts. Because of the amount of encouraging research on its constituents, some of which I have just shared with you, we are proud and excited to be introducing SereniSelect™ to you as an assist and look forward to your feedback.

SereniSelect™ – Moss Nutrition

Available in both 60 & 120 Vegetarian Capsules