



# THE SCIENCE BEHIND ELEVATE™

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## Unlocking Your True Potential

**Written By:**

Dr. David M. Gundermann, PhD, MSc

Director of Research & Development, Blue Star Nutraceuticals

## THE SCIENCE BEHIND ELEVATE™

Whether you need to study harder, focus better, improve your memory, or increase your accuracy for whatever your purpose, Elevate™ can provide that competitive edge. Each component of Elevate™ is rapidly available upon oral administration and is able to cross the blood brain barrier for fast acting cognitive improvements to better your craft. In addition to the immediate acute effects, daily Elevate™ ingestion can improve physical and mental performance through long-term memory and cognition support.

### Performance Enhancements

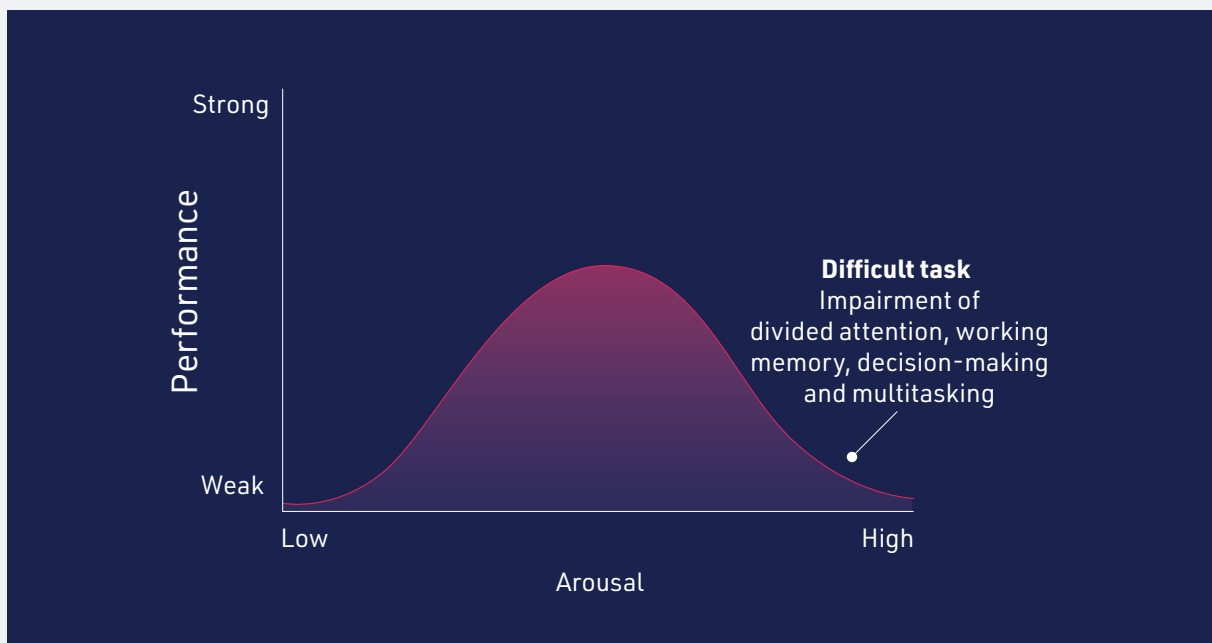
Improved performance doesn't always come from your muscles, oxygen supply, or other physiological training adaptations. Most of your performance is dependent on your state of mind. Take something simple as a basketball free-throw shot. If you can make one, you actually have the ability to make them all. You possess, the necessary muscle activation, strength, and coordination to successfully complete the shot. From a physiological standpoint, there is no reason you can't make the next shot. So why do you miss some of the time? The only variables from one shot to the next are your focus, how well your mind can control the activation of your muscles, how well you can eliminate distractions, and how well you reduce the impact of psychological pressure. This same concept is true for nearly every event you want to have your best performance, whether it is public speaking, doing well on a test or exam, or any physical demand that requires superior reaction time, coordination or awareness. Stress and pressure play large roles in your performance, both physically and mentally. Being able to think quickly on your feet can make drastic improvements to your performance from making the right athletic maneuver in a high-pressure sports game to answer the best answer in an interview at your dream job.

Variances in performance is typically attributed to the level of mental arousal. Research has found that different tasks require different levels of arousal for optimal performance. In regards to difficult tasks that require focus, memory, multitasking or decision making, over-arousal from pressure, excitement or nervousness will impair performance (**Figure 1**).

Reducing the impacts of stress and improving focus will be the key to successful and optimal performance of nearly any kind. Phosphatidylserine and L-theanine are both included in Elevate™ to specifically enhance performance in ways your muscles can't.

**Phosphatidylserine (PS)** is a phospholipid found in high amounts in human neural tissue, where it contributes to cognitive functioning and plays a critical role in both maintaining and improving mental performance. Research with PS has indicated improvements with name and face recognition, recalling locations of misplaced objects, concentration and focus. Multiple scientific studies have shown that

supplementation of PS can improve mood, cognitive functioning, sport performance, endocrine response to stress, and decreased perception of soreness following exercise. Short-term supplementation with PS has been shown to attenuate cortisol response to moderate stressors. This is accomplished through manipulation of the hypothalamo-pituitary-adrenal (HPA) axis, dampening the adrenocorticotrophic hormone (ACTH) and cortisol response to physical stress, resulting in reduced perceived stress and improved athletic performance. In a study with 20 young healthy golfers, PS supplementation significantly increased drive accuracy by 22% (number of straight shots). Overall, PS supplementation results in improvements in feeling clear-headed, composed, confident, energetic and elated, all of which will improve performance.



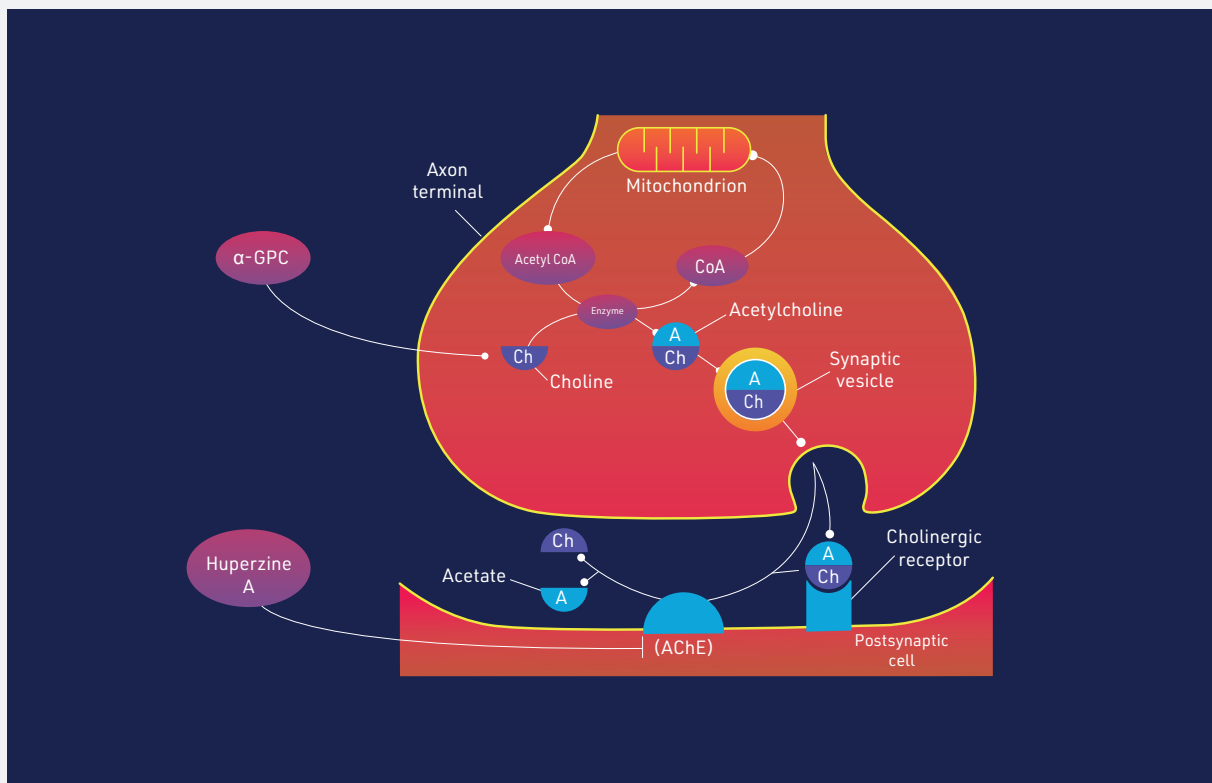
**Figure 1.** Relationship between mental arousal and performance.

**L-theanine** is an analogue of the amino acid glutamate contained in green tea leaves that is known to block the binding of L-glutamic acid to glutamate receptors in the brain. Within the first hour post-ingestion, serum, liver and brain concentration of L-theanine increase. While they decline sharply in other tissues, L-theanine remains elevated in the brain and only starts to decline 5 hours after administration. L-theanine influences the secretion and function of neurotransmitters in the CNS within 30 minutes after oral administration. Characteristics of L-theanine suggest it may influence psychological and physiological states under stress. 200 mg of L-theanine intake resulted in a reduction in the heart rate (HR) response to an acute stress task relative to a placebo control condition. Theanine increases serotonin, dopamine, GABA and glycine in various areas of the brain and has reported to reduce mental and physical

stress, improve cognition and boost mood and cognitive performance. Combined, the effects of PS and L-theanine together can manage catecholamine responses to stressful stimuli and reduce the impact of self-inflicted or external pressure and/or anxiety to optimize performance. These attributes in Elevate™ work in concert with a perfect storm of nootropics to enhance cognitive attributes.

### Cognitive Enhancements

More than just optimizing performance through the management of mental arousal, Elevate™ employs a customized blend of cognitive boosting ingredients to further support brain and nervous system functioning. This class of ingredients, commonly referred to as nootropics, have been shown to improve executive cognitive functioning, memory, creativity and even motivation. Combining the following proven nootropics with the performance enhancing effects of PS and L-theanine creates the perfect storm for the ultimate brain booster.



**Figure 2.** Mechanism of how  $\alpha$ -GPC and huperzine A influences neurotransmission.  $\alpha$ -GPC contributes choline (Ch) across the blood brain barrier into the neurons and promotes acetylcholine (ACh) production which is then used as a neurotransmitter to communicate with the neighboring neuron. Huperzine A extends the life of ACh by inhibiting its breakdown via inhibiting the enzyme acetylcholinesterase (AChE).

**Alpha Glycerylphosphorylcholine (α-GPC)** is a natural choline compound found in the brain. Choline is used in the synthesis of acetylcholine, which is the main neurotransmitter of the central nervous system. Supplementation of α-GPC has been shown to cross the blood brain barrier and deliver an increase in choline to the brain, and serve as a precursor to acetylcholine. Elevated levels of acetylcholine has been attributed to support memory, mental clarity and healthy formation of synaptic connections between neurons. In double blind trials, α-GPC boosted attention, concentration, memory, learning and mood.

**Huperzine A** is a naturally occurring compound concentrated in the species called *Huperzia serrata* that penetrates the blood-brain barrier and inhibits acetylcholinesterase (AChE). AChE is the enzyme that degrades acetylcholine between neurons and prevents overstimulation. Inhibiting AChE activity thus enhances the duration in which acetylcholine can communicate with the neighboring neuron improving nerve transmission and ultimately cognitive function, mental function and coordination (**Figure 2**).

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### YOU SHOULD KNOW

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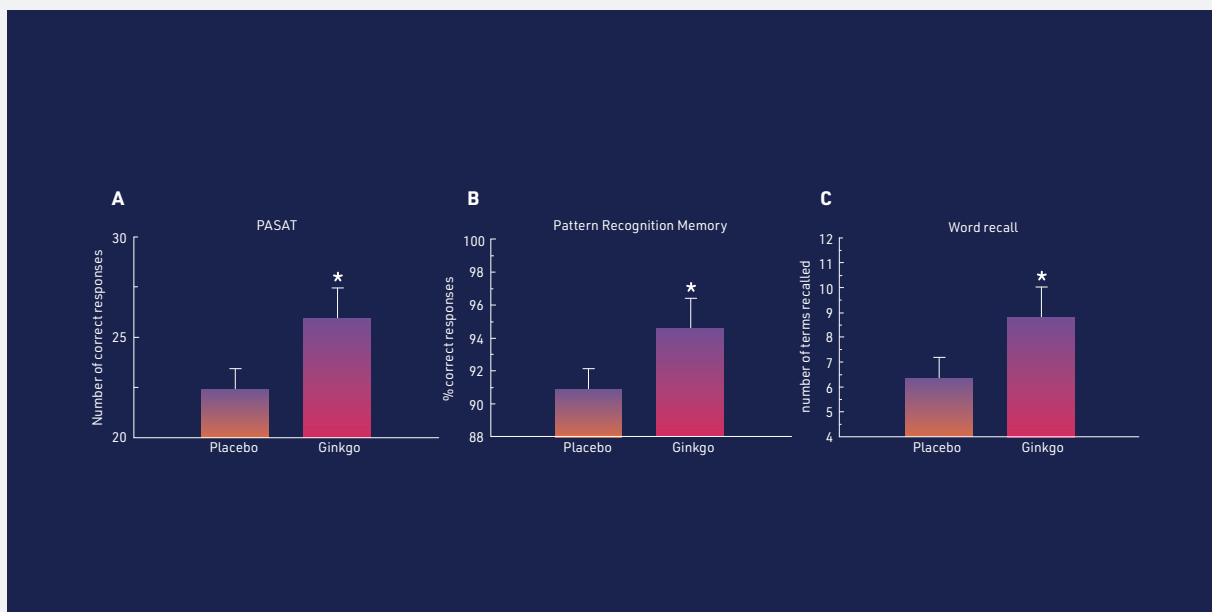
Research has found that different tasks require different levels of arousal for optimal performance. It has been established that over arousal during difficult tasks can impair cognitive performance. Reducing the impacts of stress will be the key to improve focus and optimize performance of nearly any kind. Ingredients in Elevate™ specifically enhance performance in ways your muscles can't.

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In addition to being an AChE inhibitor, Huperzine A possesses the ability to protect cells against hydrogen peroxide, beta-amyloid protein (or peptide), glutamate, ischemia and cell death. These protective effects are related to its ability to attenuate oxidative stress, regulate the expression of cell-destroying proteins, protect mitochondria, upregulate nerve growth factor and its receptors. Pharmacokinetic studies in rodents, canines, and healthy human volunteers indicated that Huperzine A is absorbed rapidly, distributed widely in the body, and eliminated at a moderate rate with the property of slow and prolonged release after oral administration. Human clinical trials have shown improvement in memory function and cognitive enhancement. Compared with other AChE inhibitors, Huperzine A has high penetration through the blood-brain barrier, higher oral bioavailability, and longer duration of AChE inhibitory action. In a study with 68 junior middle school students complaining on memory inadequacy, 34 of them supplemented with Huperzine A capsules for 4 weeks and 34 of them were given a placebo. After 4 weeks, a memory test showed a significant improvement in memory quotient in the treatment group by 25% whereas the placebo group failed to significantly improve their memory quotient.

**Ginkgo biloba** is an ancient fossil tree commonly used for its cognitive enhancing properties. Several active components within Ginkgo biloba such as ginkgetin, isoginkgetin and ginkgolides, have been shown to have vasodilatory properties to increase cerebral blood flow. Extracts also possess a neuroprotective potential through an antioxidant effect in the brain. Most importantly, Ginkgo biloba is known to act as an antagonist to GABA receptors which are responsible for slowing down brain activity. While there is a lot of interest in dementia diseases, there is also some evidence of improved cognition in healthy populations. Clinical outcome measurements such as working memory, memory consolidation, memory quality, mental flexibility, speed of attention and sustained attention were all shown to increase with a dose of Ginkgo biloba as low as 120 mg per day and improved performance up to 240 mg per day.

The effects are not only from chronic administration. Acute studies show that Ginkgo significantly improves the 'quality of memory' between 1- and 4-hours post dose. The acute dose of ginkgo significantly improved performance on the sustained attention task and pattern-recognition memory task (**Figure 3**).

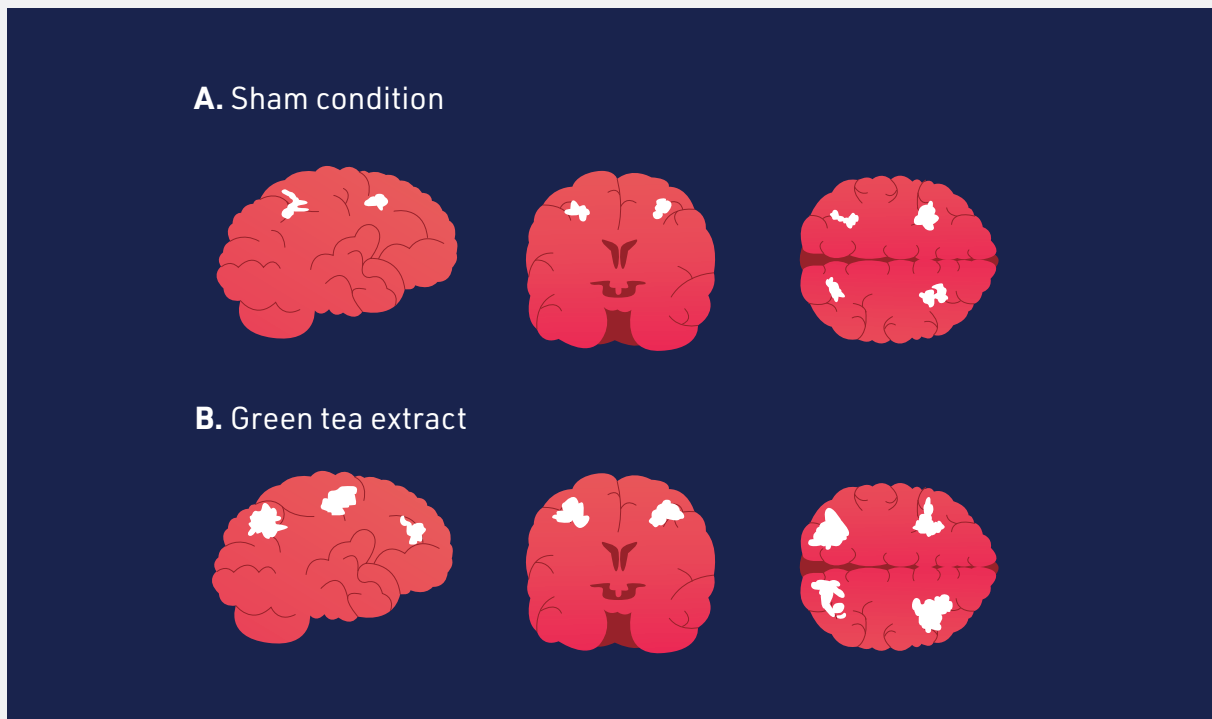


**Figure 3.** The acute effects of Ginkgo biloba or placebo 4-hours after ingestion on standardized cognitive tests: A. Paced auditory serial addition test (PASAT), B. Pattern recognition and memory test, C. word recall test. \*p<0.05 vs placebo.

**Green tea extract (GTE)** has many functional abilities when it comes to supplements. However, there is also an established connection with how GTE interacts with L-theanine. Multiple studies indicate that when combined with L-theanine, green tea extract improves attention and memory in as little as 8 weeks of supplementation. GTE plays a role in the attenuation of amyloid production in order to protect nerve cells in addition to anticholinesterase activity. One additional mechanism is that green tea combined

with L-theanine has been shown to regulate the activity of the theta power spectrum in the brain as assessed by electroencephalography (EEG). It is reported that theta power spectrum is directly related to active mental performance such as learning and goal-driven tasks. One particular study observed that the combination of GTE and L-theanine increases theta activity associated with an increase in cognitive functions such as memory and attention.

A recent study further investigated the neural mechanisms underlying the benefits of GTE on cognitive functioning using functional magnetic resonance imaging (fMRI). The main findings were that GTE significantly increases brain activity and the enhanced activity was positively correlated with its effect on task performance (**Figure4**).



**Figure 4.** Brain activity measured by functional magnetic resonance imaging (fMRI) after green tea extract (GTE) ingestion or placebo. Brighter areas indicate greater activity.

Finally, there is also a synergistic relationship between GTE and huperzine A on antiacetylcholinesterase activity. Because huperzine A exists in such low quantities of *Huperzia serrata* the polyphenol, epigallocatechin gallate, in GTE uses a mechanism to greatly augment the distribution and binding of huperzine A. This complementary effect of GTE on huperzine A and L-theanine makes it a valuable component to Elevate™

**Hordenine + Beta-Phenylethylamine (β-PEA)** is a very clever combination of ingredients. β-PEA functions as a neuromodulator and neurotransmitter in the CNS. This is the same compound that is synthesized from the amino acid phenylalanine during exercise in the brain and is linked to the therapeutic effects of physical exercise. It is also the feel-good chemical that exists in chocolate. Being structurally similar to amphetamine, it also affects norepinephrine, dopamine and acetylcholine release and inhibits their degradation. It is also a potent euphoriant.

By oral route, β-PEA is rapidly metabolized specifically by monoamine oxidase B (MAO-B) in the liver and thus on its own has a short half-life in the body. Fortunately, hordenine is a MAO-B substrate and thus acts as a competitive inhibitor of MAO-B such that as Hordenine occupies substrate sites in MAO-B, the catabolism of β-PEA will be slower, thus extending its half-life.

**Rhodiola rosea** is a traditional Chinese medicine herb and one of the most popular adaptogen classified as an anti-fatigue agent. Rhodiola rosea has the most pronounced effect on mental fatigue during stress and strain. It appears to be able to significantly reduce the effects of prolonged and minor physical exhaustion that results in fatigue. Several clinical studies have been conducted to investigate the benefits of Rhodiola rosea in a young healthy population. 50 mg of Rhodiola rosea given twice daily to male students during an examination period at a medical academy for 20 days was able to improve accuracy of movement versus speed by 104%, general well-being by 11%, and mental fatigue by 43%. In a follow-up to that study, the students in the treatment group scored 8.43% higher than the placebo group on the exams. 144 mg given to students for 1 week was able to significantly reduce experienced level of fatigue by 39% and reduce experienced stress by 19%. 170 mg given to young healthy physicians for 2 weeks during the night shift, was able to significantly reduce fatigue and improve work performance by approximately 20% (assessed by the fatigue index). 200 mg has been shown to increase endurance capacity during an incremental exercise test to volitional exhaustion on a bicycle ergometer.



**Rob Riches**

Blue Star Nutraceuticals® Athlete



## CONCLUSION

The combination of nine specialized and research backed ingredients is what makes Elevate™ a powerful supplement for your brain and nervous system. The body can only do what your CNS can control, and a lot of the time, the CNS can be the limiting step in preventing your optimal performance and/or development. Elevate™ can be used in an acute setting thirty minutes before needing to study harder for a test, being more alert while at work, or performing better during a game. Or, take Elevate™ daily for chronic adaptations for overall greater cognitive power, learning abilities and functioning. Whatever your interests are, Elevate™ can take you to the next frontier you didn't realize existed.

A full-page photograph of a muscular man with short, light-colored hair, running on a sandy beach. He is shirtless and wearing black athletic shorts with "BLUE STAR" written on the left leg. He is wearing a black watch on his left wrist and a black wristband on his right wrist. The background shows a vast, open landscape with mountains under a clear sky.

**Rob Riches**

Blue Star Nutraceuticals® Athlete

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## About The Author

Dr. David Gundermann is an award winning nutritional product development scientist, clinical researcher, and known expert in muscle health and metabolism. He developed his passion for health & fitness at a very early age growing up in a family of accomplished competitive athletes.

As Director of Research and Development at Blue Star Nutraceuticals®, he leads all efforts concerning product formulation, key ingredient research, flavor science, long-term scientific assessment, and proprietary development.

**Dr. David Gundermann, PhD, MSc**

**Blue Star Nutraceuticals Inc.**  
3-5 Edinburgh Road South  
Guelph, Ontario, N1H 5N8

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[info@bluestarnutraceuticals.com](mailto:info@bluestarnutraceuticals.com)  
[www.bluestarnutraceuticals.com](http://www.bluestarnutraceuticals.com)