L-Tyrosine
An Amino Acid for Stress Management

- Supports performance during prolonged, high-stress work
- Enhances cognitive function and alertness during multitasking and sleep deprivation
- AOR offers a potent and effective daily dose

Gluten Free  Vegan  Non-GMO  Stress

AOR Code  Variant
AOR04057  180 VEGI-CAPS

Details
L-Tyrosine is an amino acid found in wheat germ, oats, dairy products, pork and poultry. It is a precursor for the neurotransmitters epinephrine, norepinephrine, and dopamine, which are all essential for mood, cognitive function and central nervous system function. The most prevalent usage for supplemental L-tyrosine appears to be the enhancement of cognitive function and alertness under conditions of environmental stress such as sleep deprivation, multi-tasking in the workplace, and functioning at high altitudes and/or cold temperatures. It is noteworthy to mention that a high percentage of the studies done on L-tyrosine are conducted by the military looking to enhance focus and attention in their personnel. Clinical trials with L-tyrosine have also been conducted with respect to attention deficit disorder (ADD) with good results. L-Tyrosine is also used by the body to make thyroid hormones as well as melanin, the skin and hair pigment.

L-Tyrosine is ideal for those who are required to work long hours under stressful conditions, those whose lifestyles or work require a high degree of multitasking, those who experience prolonged physical and mental stress, students, and those who have difficulty concentrating such as in ADD.

Label Info

Discussion
L-Tyrosine helps in the management of both physical and psychological stress, including the stress caused by sleep deprivation and multitasking.

**Product Variation**

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<th>Product Code</th>
<th>Size</th>
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<tr>
<td>AOR04057</td>
<td>180 VEGI-CAPS</td>
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**Supplements Facts**

<table>
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<th>Serving Size: 1 Capsule</th>
<th>Amount</th>
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<tr>
<td>L-Tyrosine</td>
<td>600 mg</td>
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Non-medical ingredients:
- sodium stearyl fumarate
- Capsule: hypromellose

** Guarantees**

AOR™ guarantees that all ingredients have been declared on the label. Contains no wheat, gluten, nuts, peanuts, sesame seeds, sulphites, mustard, soy, dairy, eggs, fish, shellfish or any animal byproduct.

**Adult Dosage**

Take 6 capsules in the morning on an empty stomach, or as directed by a qualified health care practitioner.

**Cautions**

For prolonged use, consult a health care practitioner. Supplemental L-tyrosine may increase blood pressure or lead to difficulty sleeping in some persons. Consult a health care practitioner prior to use if you have hyperthyroidism, Graves’ disease or active melanoma, or if you are taking dopamine, thyroid hormone medication, contraceptives or other psychoactive medications. Do not use if you are pregnant or breastfeeding, or have the genetic metabolic disorder phenylketonuria (PKU). Discontinue use if you experience nausea, headache, fatigue, heartburn or joint pain.

**Source**

Biofermentation from corn

**Main Application**

Physical and mental stress

Neurotransmitter function

**Disclaimer**
The information and product descriptions appearing on this website are for information purposes only, and are not intended to provide or replace medical advice to individuals from a qualified health care professional. Consult with your physician if you have any health concerns, and before initiating any new diet, exercise, supplement, or other lifestyle changes.

Research
Background

L-Tyrosine, or simply tyrosine, is one of the 20 amino acids, most of whom are found in common mammalian proteins. Foods rich in tyrosine include wheat germ, granola, oats, cheeses, dairy products, chocolate, yogurt, pork, turkey, chicken, and wild game. However, trying to obtain the benefits of tyrosine from the diet is not an option, since the foods that are the richest sources of tyrosine, namely turkey and wild foul, are also the richest sources of the amino acid tryptophan, which is notorious for its ability to induce lethargy and sleep.

Tyrosine is considered non-essential, as it can be synthesized endogenously from another amino acid, phenylalanine. Some individuals suffer from a hereditary condition known as phenylketonuria, which is characterized by the absence of a specific enzyme (phenylalanine hydroxylase) that is required for the synthesis of phenylalanine into tyrosine. This condition requires strict dietary abstinence from foods high in phenylalanine.

Tyrosine is also the precursor for the neurotransmitters epinephrine, norepinephrine, and dopamine, which are chemicals that are essential for cognitive and central nervous system function. It is also the precursor of the hormone thyroxine, as well as melanin, the skin and hair pigment.

What Are The Therapeutic Uses For Tyrosine?

According to research, the most prevalent usage for supplemental tyrosine appears to be the enhancement of cognitive function and alertness under conditions of environmental stress, such as sleep deprivation, multi-tasking, and functioning at high altitudes and/or cold temperatures. It is more than noteworthy to mention that a significantly high percentage of the clinical studies of tyrosine are conducted by the military, specifically that of the United States. Clinical trials with tyrosine have also been conducted with respect to attention deficit disorder (ADD).

Multi-tasking

In the modern workplace, multi-tasking refers to the number of competing tasks and responsibilities that simultaneously require an employee’s attention. The proper execution of a diverse battery of tasks requires optimal cognitive flexibility. Typing, researching, memorizing, calculating, and providing and/or accepting oral instruction, all require the coordinated utilization of different (and cognitively competing) spheres of the brain. Neurotransmitters have to send messages from one neuron to another at sufficient speed in order to ensure an effective operation. The fact that tyrosine naturally enhances the numbers and activity of such neurons is what led researchers to test it for its effectiveness within a stressful, multi-tasking office environment.

In an exceptionally thorough office trial, 20 healthy subjects (10 males and 10 females) underwent four standardized tests on a computer screen simultaneously; these consisted of a memory test, an arithmetic test, a visual monitoring test, and an auditory monitoring test. The results of the study
revealed that the tyrosine group displayed significantly enhanced accuracy and working memory scores over the control group that received a placebo.

Research

Sleep Deprivation
Military life is one of the few areas of employment in modern society where the work is meant to be as physically and as psychologically taxing on its employees as possible. Soldiers are meant to function under conditions that are often unnaturally stressful, and none more so than those imposed on the pilots of the United States Marine Corps. In a study conducted at the U.S. Naval Aerospace Medical Research Laboratory in Pensacola, Florida, 20 such marine aviators (all males, aged 21-27) volunteered to help determine if tyrosine can improve alertness during periods of sleep deprivation. After being deprived of sleep for 24 hours, the marines taking tyrosine scored markedly higher and made significantly fewer errors in their standardized tests which measured their hand-eye coordination, memory capacity, and comprehensive skills.

High Altitudes and Cold Weather
Hypoxia is the condition whereupon the body’s tissues are deprived of oxygen. This can take place in high altitudes (due to thin air) and extremely cold temperatures (due to constricting arteries). High altitude exposure causes hypobaric hypoxia, and additional exposure to extremely cold temperatures can further exacerbate this cognitive impairment. The bottom biological line is that acutely stressful situations (such as, but not limited to – hypoxia) can deplete brain norepinephrine and dopamine levels, thus disrupting behaviour and performance.

Human studies with tyrosine have been impressive. A series of clinical trials were conducted by the U.S. Army Research Institute of Environmental Medicine in Natick, Montana among soldiers operating at mountainous altitudes of 15,300 feet. They revealed that “tyrosine significantly mitigated many of the decrements in symptoms, mood, and performance induced by [hypobaric hypoxia], including functions believed to be regulated by catecholaminergic neurons such as vigilance, alertness, and anxiety.”

The United States Air Force, for its part, commissioned a study investigating the effectiveness of tyrosine on acute cardiovascular stress. Using a method designed to simulate gravitational stress (orthostasis), subjects who were given tyrosine experienced stabilized pulse pressures and increased central nervous system activity.

Animal Studies: Better Performance Under Stress
Extensive animal studies have revealed some very interesting revelations about tyrosine. In a series of trials, laboratory rats that were pre-treated with tyrosine were subjected to the Porsolt swim test, which is when the rats are placed in an escape-proof tank filled with freezing water. The amount of time that the rats were immobilized by the freezing water was then measured. It was found that the rats that were pre-treated with tyrosine had their immobility time reduced significantly, so much so in fact that the performance levels of these animals matched those that were not exposed to cold-induced stress.

Another type of test called the Morris water maze tested spatial learning and memory in laboratory rats exposed to a simulated height of 19,500 feet for 8 hours. The decrements in performance among
ADD
ADD or Attention Deficit Disorder (sometimes referred to as attention deficit hyperactivity disorder, or ADHD) can be defined as a persistent pattern of inattention, hyperactivity, and impulsivity, occurring more frequently and severely than is typical in individuals at a comparable level of development. As expected, many diagnoses occur among schoolchildren, and there appears to be some connection between this disorder and the maintenance of adequate levels of certain amino acids, especially phenylalanine, tyrosine, tryptophan, histidine, and isoleucine. In fact, recent data suggest that children with phenylketonuria (PKU) may have an increased prevalence of attentional dysfunction.

The results from studies conducted with tyrosine with specific regard to ADD have been mixed, with their beneficial role being limited to a temporary one. In one noted clinical trial, 12 adults with ADD supplemented with tyrosine for 8 weeks. After 2 weeks, 8 of these subjects showed “marked to moderate” improvements, but after 6 weeks these particular subjects developed tolerance against tyrosine supplementation. The temporary improvements experienced by these subjects, however, leaves open the potential usage of tyrosine in cases of ADD that are of a transient type.

Dosage and Safety
Most of the successful human trials with tyrosine, especially those conducted by the U.S. military, used doses of 100-150 milligrams for every kilogram of bodyweight. This would equate to 8-12 grams of tyrosine for a 175 pound subject, and no discernibly adverse side effects were noted.

Market Trends
L-Tyrosine is most commonly used as an ergogenic acid to improve performance under physical and mental stress and for muscle recovery. It is also known for helping to treat depression.

AOR Advantage
AOR offers an effective dose of this beneficial amino acid.

References


Neri DF, et al. The Effects of Tyrosine on Cognitive Performance during Extended Wakefulness. Aviat
Abstract

Tyrosine supplementation mitigates working memory decrements during cold exposure.

Physiol Behav. 2007 May 22.

Mahoney CR, Castellani J, Kramer FM, Young A, Lieberman HR.

In rats, dietary supplementation with the amino acid tyrosine (TYR) prevents depletion of central catecholamines observed during acute environmental stress. Concomitant changes in the animals’ behavioral responses to stress suggest that TYR might have similar effects on central catecholamines and cognition in humans exposed to environmental stress. This study aimed to determine if severe cold exposure impairs human cognition and if dietary supplementation with TYR would ameliorate such deficits. Volunteers (N=19) completed three test sessions on different days (35 degrees C control/placebo, approximately 10 degrees C/placebo, approximately 10 degrees C/TYR) using a double-blind, within subjects design. During each session, volunteers completed two 90-minute water immersions and consumed a food bar (150 mg/kg TYR or placebo) before each immersion (total TYR 300 mg/kg). Cognitive performance, mood, and salivary cortisol were assessed. Cortisol was elevated in the cold

Dietary tyrosine benefits cognitive and psychomotor performance during body cooling.

Physiol Behav. 2007 Feb 28;90(2-3):301-7.

O’Brien C, Mahoney C, Tharion WJ, Sils IV, Castellani JW.

Supplemental tyrosine is effective at limiting cold-induced decreases in working memory, presumably by augmenting brain catecholamine levels, since tyrosine is a precursor for catecholamine synthesis. The effectiveness of tyrosine for preventing cold-induced decreases in physical performance has not been examined. This study evaluated the effect of tyrosine supplementation on cognitive, psychomotor, and physical performance following a cold water immersion protocol that lowered body core temperature. Fifteen subjects completed a control trial (CON) in warm (35 degrees C) water and two cold water trials, each spaced a week apart. Subjects ingested an energy bar during each trial; on one cold trial (TYR) the bar contained tyrosine (300 mg/kg body weight), and on the other cold trial (PLB) and on CON the bar contained no tyrosine. Following each water immersion, subjects completed a battery of performance tasks in a cold air (10 degrees C) chamber. Core temperature
was lower (p=0.0001) on PLB and TYR (both 35.5 /-0.6 degrees C) than CON (37.1 /-0.3 degrees C). On PLB, performance on a Match-to-Sample task decreased 18% (p=0.02) and marksmanship performance decreased 14% (p=0.002), compared to CON, but there was no difference between TYR and CON. Step test performance decreased by 11% (p=0.0001) on both cold trials, compared to CON. These data support previous findings that dietary tyrosine supplementation is effective for mitigating cold-induced cognitive performance such as working memory, even with reduced core temperature, and extends those findings to include the psychomotor task of marksmanship.