L-Tyrosine

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What we Should Know About This Important Amino Acid

Research shows that supplementation with Tyrosine in the range of 30-150 mg/kg body weight may provide the following benefits:

a. Compensates for the age related decline in Tyrosine metabolism[1]

b. Supports fat loss regimens as follows:
- may reduce appetite[20, 21]
- maintains NE (Norepinephrine) production which stimulates fat release from the fat cells[22, 25]

c. Supports the brain Dopamine/ Norepinephrine production, thus providing support for:
- cognitive performance (memory and learning) and uplifted mood[4, 17]
- mood disorders associated with oral contraceptive use[21]
- anti-depressant therapies whether natural or pharmacological[8]
- maintenance of an alert state in spite of inadequate sleep[7]
- therapies for Dopamine related addictions (cocaine, amphetamine, smoking)[24], Phenylketonuria[13], Parkinson's[23] and Alzheimer's[26].
- therapies for Chronic Fatigue Syndrome[27]

d. Supports the Dopamine/Norepineprine/ Epinephrine production by the adrenal gland and consequently:
- compensates for adrenaline depletion states such as excessive psychological or physical stress and dieting[11, 18]
- prevents excessive rises in cortisol levels[12]

e. Improves stamina for exercise by providing the precursor to E/NE release from nerve endings[28]

f. Precursor to Thyroid hormone[15]

g. Precursor to Melanin, which is protective against UV radiation[16]

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Tyrosine is a non-essential amino acid synthesized in the body from the essential amino acid phenylalanine. The typical dietary amount provided by a 3 oz portion of animal protein is 0.3-1g of tyrosine.

Tyrosine is the precursor amino acid from which the body makes Dopamine (with vit B6 as cofactor), which is then converted to NE (Norepinephrine) (with vitamin C as cofactor) and then to E (Epinephrine) (with SAMe as cofactor).

Tyrosine competes for uptake with other LNAA (Large Neutral Amino Acids), so in order to maximize absorption from the supplemented Tyrosine into various tissues (such as brain, adrenals, nerves); it should be taken on an empty stomach or two hours away from a protein containing meal.

Ingesting Tyrosine with a snack/meal of high glycemic carbohydrates at the same time will facilitate its entry in the brain by pushing certain competitor amino acids into the muscle. However, this scenario involves a large surge of insulin which in most cases is not beneficial.

Here are some highlights from studies with Tyrosine that found benefits as stated to the left:

a. Tyrosine metabolism declines with age, so, in addition to the Tyrosine provided by the diet, supplemental Tyrosine may be needed, along with higher doses of all the necessary cofactors: vit C, B6, Folic acid, SAMe.[1]

b. "Tyrosine might alleviate some of the different pathophysiological problems associated with the stress of weight loss."[1]

"Tyrosine concentrations rise as much as two- to threefold between 0% and 10% dietary protein content. This increase produces a clear stimulation of the rate of catecholamine synthesis, observed both for DA and NE, and notably in the hypothalamus, a brain area involved in appetite regulation."[20]

c. "These results suggest that tyrosine plasma levels and cathecholamines may be important factors in regulating mood and memory."[17]

"On the very first day of treatment with oral-tyrosine (3,200 mg/day) a return to mood, as judged by clinical impression and MADRS scores was observed for twelve patients with polysommographic and clinical signs of dopamine-dependent depression (DDD). More than 50 patients have now been treated successfully for periods ranging from a few months to almost 2 years."[8]

"The results suggest that the decreased Tyrosine availability to the brain in oral contraceptive users may result in a substrate-limited reduction of brain noradrenaline formation, which, secondarily, may contribute to disturbances of mood, coping mechanisms, and appetite in susceptible subjects."[21]

Studies with measurements of urinary metabolites of E/NE have proven that Tyrosine supplementation can normalize the adrenaline levels, when depleted by intensive training and lack of sleep and improve alertness following sleep deprivation.[7]

Tyrosine supplementation helps support normal protein and catecholamine synthesis in phenylalanine-restricted diets.[13]

d. "..catecholaminergic neurons respond to the precursor amino acid only when they are physiologically active. Supplementary tyrosine may be useful therapeutically in people exposed chronically to stress."[18] "These findings suggest that, in healthy women, reduced serotonin and/or catecholamine neurotransmission increases vulnerability to lowered mood, especially following exposure to aversive psychological events."[6]

"..numerous studies suggest that NE inhibits the release of adrenocorticotropic hormone (ACTH) by suppressing corticotropic releasing factor (CRF) secretion in the hypothalamus", so adequate levels of NE might prevent excessive rises in Cortisol levels."[12]

f. "resupplementation of phenylalanine and tyrosine after 8 weeks of depletion gave a rapid increase in serum T4, T3, free T4, and reverse T3. These results suggested that the primary hypothyroidism was caused by an impaired T4 production and that the deficiency of amino acids in protein-calorie malnutrition partly contributed to the impairment of T4 production."[15]

Studies have used effective doses of Tyrosine in the range of 30-150 mg/kg body weight, which translates into a total of between 1500 mg-7.5 g for a 50Kg=110 lb man.

Tyrosine is also part of numerous important enzymes involved in various pathways of hormonal signaling such as insulin.

Interactions with Herbs

Tyrosine works synergistically with Green Tea (see Green Tea flyer) and Rhodiola (see Supporting Neurotransmitter Production Naturally flyer) in maintaining NE levels.

Interactions with Drugs

There is some concern that tyrosine might decrease the effectiveness of L-dopa (Levodopa). Tyrosine and Levodopa compete for absorption in the proximal duodenum by the large neutral amino acid (LNAA) transport system (2719). Advise patients to separate doses of tyrosine and L-dopa by at least 2 hours. Tyrosine supplementation has the potential of increasing the effect of drugs that affect dopamine metabolism such as Wellbutrin and MAO or COMT inhibitors and anorectic drugs such as phentremine, Ionamie, Meridia.

Who Should Not Take Tyrosine?

Tyrosine should not be taken by those with diagnosed schizophrenia, manic conditions, anxiety, insomnia, cancer or skin cancer without consulting their health care practitioner. Tyrosine can interfere with the effectiveness of anti-psychotic drugs (Tyrosine hydroxylase inhibitors).

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