Health Canada Santé Canada

L-TYROSINE

Date: March 17, 2008

Proper name(s): L-Tyrosine (NIH 2007; USP 30)

Common name(s): L-Tyrosine, tyr, tyrosine (NIH 2007; USP 30)

Source material(s): L-Tyrosine (USP 30)

Route(s) of administration: Oral

Dosage form(s): Those pharmaceutical dosage forms suited to oral administration, including but not limited to chewables (eg. gummies, tablets), caplets, capsules, strips, lozenges, powders or liquids where the dose is measured in drops, teaspoons or tablespoons, are acceptable.
This monograph is not intended to include food-like dosage forms such as bars, chewing gums or beverages.

Use(s) or Purpose(s): Statement(s) to the effect of:

Helps to decrease cognitive fatigue due to physically stressful situations (e.g. extended wakefulness, exposure to cold, excessive noise) (Mahoney et al. 2007; O'Brien et al. 2006; Magill et al. 2003; Thomas et al. 1999; Dollins et al. 1995; Neri et al. 1995).

Dose(s): 10 g, 1-2 times per day (Mahoney et al. 2007; O'Brien et al. 2006; Magill et al. 2003; Thomas et al. 1999; Neri et al. 1995).

Directions for use: Take up to one hour before, or during periods of physical stress (Mahoney et al. 2007; O'Brien et al. 2006; Magill et al. 2003; Thomas et al. 1999; Neri et al. 1995).

Duration of use: For occasional use only.

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Risk information: Statement(s) to the effect of:

Caution(s) and warning(s):

- Consult a health care practitioner prior to use if you are pregnant or breastfeeding.
- Consult a health care practitioner prior to use if you are following a low protein diet (Goldman and Ausiello 2004).

Contraindication(s): No statement required.

Known adverse reaction(s): No statement required.

Non-medicinal ingredients: Must be chosen from the current NHPD *List of Acceptable Non-medicinal Ingredients* and must meet the limitations outlined in the list.

Specifications:

- The finished product must comply with the minimum specifications outlined in the current NHPD *Compendium of Monographs.*
- The medicinal ingredient must be pharmacopoeial grade (for a list of acceptable pharmacopoeia, see the NHPD *Evidence for Quality of Finished Natural Health Products* Guidance Document) or cited in an approved NHP Master File, authorized by a letter of access issued to the applicant by the NHP Master File's registered owner.

References cited:

Dollins AB, Krock LP, Storm WF, Wurtman RJ, Lieberman HR L-tyrosine ameliorates some effects of lower body negative pressure stress. Physiology and Behavior 1995;57(2):223-230

Goldman L, Ausiello D, editors. Cecil Textbook of Medicine, Volume 1, 22nd edition. Philadelphia (PA): Saunders; 2004.

Magill RA, Waters WF, Bray GA, Volaufova J, Smith SR, Lieberman HR, McNevin N, Ryan DH. Effects of tyrosine, phentermine, caffeine d-amphetamine, and placebo on cognitive and motor performance deficits during sleep deprivation. Nutritional Neuroscience 2003;6(4):237-246.

Mahoney CR, Castellani J, Kramer FM, Young A, Lieberman HR. Tyrosine supplementation mitigates working memory decrements during cold exposure. Physiology and Behavior 2007;92(4):575-582.

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Neri DF, Wiegmann D, Stanny RR, Shappell SA, McCardie A, McKay DL. The effect of tyrosine on cognitive performance during extended wakefulness. Aviation, space, and environmental medicine 1995;66(4);313-319.

NIH 2007: National Institutes of Health. ChemIDplus advanced. Bethesda (MD): Specialized Information Services, National Library of Medicine, National Institutes of Health, US Department of Health & Human Services. [Accessed 2008-02-04]. Available from: http://chem.sis.nlm.nih.gov/chemidplus

O'Brien C, Mahoney C, Tharion WJ, Sils IV, Castellani JW. Dietary tyrosine benefits cognitive and psychomotor performance during body cooling. Physiology & Behavior 2007;90(2-3):301-307.

Thomas JR, Lockwood PA, Singh A, Deuster PA. Tyrosine improves working memory in a multitasking environment. Pharmacology, Biochemistry and Behavior 1999;64(3):495-500.

USP 30: United States Pharmacopeia and the National Formulary (USP 30 - NF 25). Rockville (MD): United States Pharmacopeial Convention, Inc.; 2007.

References reviewed:

Avraham Y, Hao S, Mendelson S, Berry EM. Tyrosine improves appetite, cognition, and exercise tolerance in activity anorexia. Medicine and Science of Sports and Exercise 2001;33(12):2104-2110.

Banderet LE, Lieberman HR. Treatment with tyrosine, a neurotransmitter precursor, reduces environmental stress in humans. Brain Research Bulletin 1989;22(4):759-762.

Borges CR, Geddes T, Watson JT, Kuhn DM. Dopamine biosynthesis is regulated by s-glutathionylation: Potential mechanism of tyrosine hydroxylase inhibition during oxidative stress. The Journal of Biological Chemistry 2002;277(50):48295-48302.

Chinevere TD, Sawyer RD, Creer AR, Conlee RK, Parcell AC. Journal of Applied Physiology. Effects of L-tyrosine and carbohydrate ingestion on endurance exercise performance 2002;93(5):1590-1597

David JC, Dairman W, Udenfriend S. Decarboxylation to tyromine: a major route of tyrosine metabolism in animals. Proceedings of the National Academy of Sciences of the United States of America 1974;71(5):1771-1775.

Deijen JB, Orlebeke JF. Effect of tyrosine on cognitive function and blood pressure under stress. Brain Research Bulletin 1993;33(3):319-323.

Deijen JB, Wientjes CJ, Vullinghs HF, Cloin PA, Langefeld JJ. Tyrosine improves cognitive performance and reduces blood pressure in cadets after one week of combat training. Brain Research Bulletin 1999;48(2):203-209.

Elwes RD, Crewes H, Chesterman LP, Summers B, Jenner P, Binnie CD, Parkes JD. Treatment of narcolepsy with L-tyrosine: double blind placebo controlled trial. Lancet 1989;2(8671):1067-1069.

IOM 2002: Institute of Medicine. Food and Nutrition Board. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Washington (DC): National Academy Press; 2002.

Jacob G, Gamboa A, Diedrich A, Shibao C, Robertson D, Biaggioni. Tyramine induced vasodialation mediated by dopamine contamination; a paradox resolved. Hypertension 2005;46(2):335-359.

MacDonald A, Lilburn M, Davies P, Evans S, Daly A, Hall SK, Hendriksz C, Chakrapani A, Lee P. Ready to drink' protein substitute is easier is for people with phenylketonuria. Journal of Inherited Metabolic Disease 2006;29(4):526-531.

Nilsson D, Lennernas H, Fasth KJ, Sundin A, Tedroff J, Aquilonius S, Hartvig P, Langstrom B. Absorption of L-DOPA from the proximal small intestine studied in the rhesus monkey by positron emission tomography. European Journal of Pharmaceutical Sciences 1999;7(3):185-189.

Owasoyo JO, Neri DF, Lamberth JG. Tyrosine and its potential use as a countermeasure to performance decrement in military sustained operations. (Review) Aviation, Space and Environmental Medicine 1992;63(5):364-369.

Rapaport, MH. Dietary restrictions and drug interactions with monoamine oxidase inhibitors: the state of the art. Journal of Clinical Psychiatry 2007;68(suppl 8):42-46.

Shurtleff D, Thomas JR, Schot J, Kowalski K, Harford R. Tyrosine reverses a cold-induced working memory deficit in humans. Pharmacology, Biochemistry and Behavior 1994;47(4):935-941.

Sutton EE, Coill MR, Deuster PA. Ingestion of tyrosine: effects on endurance, muscle strength, and anaerobic performance. International Journal of Sport Nutrition and Exercise Metabolism 2005;15(2):173-185.

VanDenBerg CM, Blob LF, Kemper EM, Azzaro AJ. Tyramine pharmacokinetics and reduced bioavailability with food. Journal of Clinical Pharmacology 2003;43(6):604-609.

van Spronsen FJ, van Rijn M, Bekhof J, Koch R, Smit PG. Phenylketonuria: tyrosine supplementation in phenylalanine-restricted diets. American Journal of Clinical Nutrition 2001;73(2):153-157.

Wood DR, Reimherr FW, Wender PH. Amino acid precursors for the treatment of attention deficit disorder, residual type. Psychopharmacology Bulletin 1985;21(1):146-149.

Yamada M, Yasuhara H. Clinical pharmacology of MAO inhibitors: safety and future. NeuroToxicology 2004;25(1-2):215-221.