Tyrosine, L-

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L-TYROSINE Help on accessing alternative formats, such as Portable Document Format (PDF), Microsoft Word and PowerPoint (PPT) files, can be obtained in the alternate format help section. (PDF Version - 52 KB) This monograph is intended to serve as a guide to industry for the preparation of Product Licence Applications (PLAs) and labels for natural health product market authorization. It is not intended to be a comprehensive review of the medicinal ingredient. Notes Text in parentheses is additional optional information which can be included on the PLA and product label at the applicant's discretion. The solidus (/) indicates that the terms and/or statements are synonymous. Either term or statement may be selected by the applicant. Date June 3, 2019 Proper name(s), Common name(s), Source material(s) Table 1. Proper name(s), Common name(s), Source material(s) Proper name(s) Common name(s) Source ingredient(s) Common name(s) (S)-alpha-Amino-4-hydroxybenzenepropanoic acid L-Tyrosine L-Tyrosine Tyrosine L-Tyrosine L-Tyrosine ethyl ester N-Acetyl tyrosine References: Proper names: NHPID 2019, NIH 2007, USP 30 2007; Common names: NIH 2007, USP 30 2007; Source ingredients: NHPID 2019. Route of Administration Oral Dosage Form(s) This monograph excludes foods or food-like dosage forms as indicated in the Compendium of Monographs Guidance Document. Acceptable dosage forms for any age category listed in this monograph for the specified route of administration are listed in the Compendium of Monographs Guidance Document. Use(s) or Purpose(s) 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) Subpopulation(s) Adults 18 years and older Quantity(ies) 10 - 20 grams of L-Tyrosine, per day; Not to exceed 10 grams per single dose (Mahoney et al. 2007; O'Brien et al. 2006; Magill et al. 2003; Thomas et al. 1999; Neri et al. 1995). Direction(s) 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(s) of Use For occasional use only. Risk Information Caution(s) and warning(s) Consult a health care practitioner/health care provider/health care professional/doctor/physician prior to use if you are pregnant or breastfeeding Contraindication(s) No statement required. Known adverse reaction(s) No statement required. Non-medicinal ingredients Must be chosen from the current Natural Health Products Ingredients Database (NHPID) and must meet the limitations outlined in the database. Storage conditions No statement required. Specifications The finished product specifications must be established in accordance with the requirements described in the Natural and Non-prescription Health Products Directorate (NNHPD) Quality of Natural Health Products Guide. The medicinal ingredient must comply with the requirements outlined in the NHPID. 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. 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 2019 May 15]. 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. Report a problem on this page Date modified: 2019-03-01

MEDICINAL INGREDIENT(S)

Must be chosen from the current Natural Health Products Ingredients Database (NHPID) and must meet the limitations outlined in the database. Storage conditions No statement required.

DOSAGE FORM(S)

Acceptable dosage forms for any age category listed in this monograph for the specified route of administration are listed in the Compendium of Monographs Guidance Document.

RISK INFORMATION

Caution(s) and warning(s) Consult a health care practitioner/health care provider/health care professional/doctor/physician prior to use if you are pregnant or breastfeeding Contraindication(s) No statement required. Known adverse reaction(s) No statement required.

NON-MEDICINAL INGREDIENTS

Must be chosen from the current Natural Health Products Ingredients Database (NHPID) and must meet the limitations outlined in the database. Storage conditions No statement required.

STORAGE CONDITION(S)

No statement required.

SPECIFICATIONS

The finished product specifications must be established in accordance with the requirements described in the Natural and Non-prescription Health Products Directorate (NNHPD) Quality of Natural Health Products Guide.The medicinal ingredient must comply with the requirements outlined in the NHPID.

REFERENCES

Route of Administration Oral

Proper name(s)	Common name(s)	Source ingredient(s)
Common name(s)		
(S)-alpha-Amino-4-hydroxybenzenepropanoic acidL-TyrosineTyr	L-TyrosineL-Tyrosine ethyl esterN-Acetyl tyrosine	L-TyrosineL-Tyrosine ethyl esterN-Acetyl tyrosine