

Find out how to access preview-only content

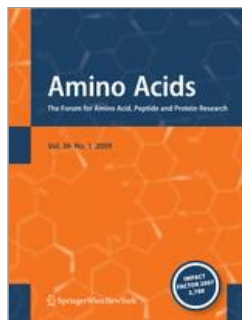
Look inside Get Access

Amino Acids
January 2009, Volume 36, Issue 1, pp 75-80

Presence of kynurenic acid in food and honeybee products

Abstract

Kynurenic acid (KYNA) is an endogenous antagonist of ionotropic glutamate receptors and the $\alpha 7$ nicotinic acetylcholine receptor, showing anticonvulsant and neuroprotective activity. In this study, the presence of KYNA in food and honeybee products was investigated. KYNA was found in all 37 tested samples of food and honeybee products. The highest concentration of KYNA was obtained from honeybee products' samples, propolis (9.6 nmol/g), honey (1.0–4.8 nmol/g) and bee pollen (3.4 nmol/g). A high concentration was detected in fresh broccoli (2.2 nmol/g) and potato (0.7 nmol/g). Only traces of KYNA were found in some commercial baby products. KYNA administered intragastrically in rats was absorbed from the intestine into the blood stream and transported to the liver and to the kidney. In conclusion, we provide evidence that KYNA is a constituent of food and that it can be easily absorbed from the digestive system.



Citations 1 Share

Within this Article

1. Introduction
2. Materials and methods
3. Results
4. Discussion
5. References
6. References

Related Content



References (27)

1. al-Khalil S, Alkofahi A, el-Eisawi D, al-Shibib A (1998) Transthorine, a new quinoline alkaloid from *Ephedra transitoria*. *J Nat Prod* 61:262–263 CrossRef
2. Birch PJ, Grossman CJ, Hayes AG (1988) Kynurenic acid antagonises responses to NMDA via an action at the strychnine-insensitive glycine receptor. *Eur J Pharmacol* 154:85–87 CrossRef
3. Covasa M, Ritter RC, Burns GA (2000) NMDA receptor participation in control of food intake by the stomach. *Am J Physiol Regul Integr Comp Physiol* 278:R1362–R1368
4. Demitrack MA, Heyes MP, Altemus M, Pigott TA, Gold PW (1995) Cerebrospinal fluid levels of kynurenine pathway metabolites in patients with eating disorders: relation to clinical and biochemical variable. *Biol Psychiatry* 37:512–520 CrossRef
5. Drieu K (1986) Preparation and definition of *Ginkgo biloba* extract. *Presse Med* 15:1455–1457
6. Fukui S, Schwarcz R, Rapoport SI, Takada Y, Smith QR (1991) Blood–brain barrier transport of kynurenines: implications for brain synthesis and metabolism. *J Neurochem* 56:2007–2017 CrossRef
7. Hermanussen M, Tresguerres JA (2005) A new anti-obesity drug treatment: first clinical evidence that, antagonising glutamate-gated Ca^{2+} ion channels with memantine normalises binge-eating disorders. *Econ Hum Biol* 3:329–337 CrossRef
8. Hilmas C, Pereira EF, Alkondon M, Rassoulpour A, Schwarcz R, Albuquerque EX (2001) The brain metabolite kynurenic acid inhibits $\alpha 7$ nicotinic receptor activity and increases non- $\alpha 7$ nicotinic receptor expression: physiopathological implications. *J Neurosci* 21:7463–7473
9. Jankovic SM, Milovanovic D, Matovic M, Iric-Cupic V (1999) The effects of excitatory amino acids on isolated gut segments of the rat. *Pharmacol Res* 39:143–148 CrossRef
10. Jo YH, Wiedl D, Role LW (2005) Cholinergic modulation of appetite-related synapses in mouse lateral hypothalamic slice. *J Neurosci* 25:11133–11144 CrossRef
11. Kaszaki J, Palasthy Z, Erczes D, Racz A, Torday C, Varga G, Vecsei L, Boros M (2008) Kynurenic acid inhibits intestinal hypermotility and xanthine oxidase activity during experimental colon obstruction in dogs. *Neurogastroenterol Motil* 20:53–62
12. Kazda H, Taylor N, Healy D, Walker D (1998) Maternal, umbilical, and amniotic fluid concentrations of tryptophan and kynurenine after labor or cesarean section. *Pediatr Res* 44:368–373 CrossRef
13. Kuc D, Rahnama M, Tomaszewski T, Rzeski W, Wejsza K, Urbanik-Sypniewska T, Parada-Turska J, Wielosz M, Turski WA (2006) Kynurenic acid in human saliva—does it influence oral microflora? *Pharmacol Rep* 58:393–398
14. Kuc D, Zgrajka W, Parada-Turska J, Urbanik-Sypniewska T, Turski WA (2008) Micromolar concentration of kynurenic acid in rat small intestine. *Amino Acids*. doi:10.1007/s00726-007-0631-z
15. Lee SW, Stanley BG (2005) NMDA receptors mediate feeding elicited by neuropeptide Y in the lateral and perifornical hypothalamus. *Brain Res* 1063:1–8 CrossRef
16. Milart P, Urbanska EM, Turski WA, Paszkowski T, Sikorski R (2001) Kynurenine aminotransferase I activity in human placenta. *Placenta* 22:259–261 CrossRef
17. Nemeth H, Toldi J, Vecsei L (2005) Role of kynurenines in the central and peripheral nervous systems. *Curr Neurovasc Res* 2:249–260 CrossRef
18. Obaid AL, Nelson ME, Lindstrom J, Salzberg BM (2005) Optical studies of nicotinic acetylcholine receptor subtypes in the guinea-pig enteric nervous system. *J Exp Biol* 208:2981–3001 CrossRef
19. Orzaez Villanueva MT, Diaz MA, Bravo SR, Blazquez AG (2002) The importance of bee-collected pollen in the diet: a study of its composition. *Int J Food Sci Nutr* 53:217–224 CrossRef

20. Parada-Turska J, Rzeski W, Zgrajka W, Majdan M, Kandefer-Szerszen M, Turski W (2006) Kynurenic acid, an endogenous constituent of rheumatoid arthritis synovial fluid, inhibits proliferation of synoviocytes in vitro. *Rheumatol Int* 26:422–426 CrossRef
21. Perkins MN, Stone TW (1982) An iontophoretic investigation of the actions of convulsant kynurenines and their interaction with the endogenous excitant quinolinic acid. *Brain Res* 247:184–187 CrossRef
22. Scharfman HE, Goodman JH, Schwarcz R (2000) Electrophysiological effects of exogenous and endogenous kynurenic acid in the rat brain: studies in vivo and in vitro. *Amino Acids* 19:283–297 CrossRef
23. Shibata K (1988) Fluorimetric micro-determination of kynurenic acid, an endogenous blocker of neurotoxicity, by high-performance liquid chromatography. *J Chromatogr* 430:376–380 CrossRef
24. Tsai LH (2005) Function of GABAergic and glutamatergic neurons in the stomach. *J Biomed Sci* 12:255–266 CrossRef
25. Turski WA, Nakamura M, Todd WP, Carpenter BK, Whetsell WO Jr, Schwarcz R (1988) Identification and quantification of kynurenic acid in human brain tissue. *Brain Res* 454:164–169 CrossRef
26. Turski WA, Gramsbergen JB, Traitler H, Schwarcz R (1989) Rat brain slices produce and liberate kynurenic acid upon exposure to l-kynurenine. *J Neurochem* 52:1629–1636 CrossRef
27. Wang J, Simonavicius N, Wu X, Swaminath G, Reagan J, Tian H, Ling L (2006) Kynurenic acid as a ligand for orphan G protein-coupled receptor GPR35. *J Biol Chem* 281:22021–22028 CrossRef

About this Article

Title

Presence of kynurenic acid in food and honeybee products

Journal

Amino Acids

Volume 36, Issue 1 , pp 75-80

Cover Date

2009-01-01

DOI

10.1007/s00726-008-0031-z

Print ISSN

0939-4451

Online ISSN

1438-2199

Publisher

Springer Vienna

Additional Links

- Register for Journal Updates
- Editorial Board
- About This Journal
- Manuscript Submission

Topics

- Neurobiology
- Proteomics
- Life Sciences, general
- Biochemical Engineering
- Analytical Chemistry
- Biochemistry, general

Keywords

- Kynurenic acid
- Food
- Honeybee product
- Digestive system
- Absorption

Industry Sectors

- Biotechnology
- Health & Hospitals
- Chemical Manufacturing
- Consumer Packaged Goods
- Pharma

Authors

- Michal P. Turski ⁽¹⁾
- Monika Turska ⁽¹⁾
- Wojciech Zgrajka ⁽¹⁾
- Damian Kuc ⁽²⁾
- Waldemar A. Turski ^{(1) (2)}

Author Affiliations

1. Department of Toxicology, Institute of Agricultural Medicine, Jaczewskiego 2, 20-950, Lublin, Poland
2. Department of Experimental and Clinical Pharmacology, Medical University, Jaczewskiego 8, 20-090, Lublin, Poland

Continue reading...

To view the rest of this content please follow the download PDF link above.