Back to results | 1 of 1

Download Print Save to PDF Save to list Create bibliography

Malaysian Journal of Medicine and Health Sciences • *Open Access* • Volume 18, Issue 2, Pages 35 - 41 • March 2023

Document type
Article • *Bronze Open Access*

Source type
Journal

ISSN
16758544

DOI
10.47836/mjmhs.19.2.7

View more

Changes to GFAP Immunoreactive Astrocytes in Medial Prefrontal Cortex Following Exposure to Chronic Stress and Antioxidant Supplementation in Rat Model

Asari, Mohd Asnizam[a] ; Nawi, Faizah Md[a]; Amin, Mohammad Syabil Ikhwan Mohd[a]; Yusof, Nurul Aiman Mohd[a]; Sirajudeen K.N.S.[b]

Save all to author list

[a] Department of Anatomy, School of Medical Sciences, Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kota Bharu, Kelantan, 16150, Malaysia

[b] Department of Basic Medical Sciences, Kulliyyah of Medicine, International Islamic University Malaysia, Bandar Indera Mahkota, Pahang, Kuantan, 25200, Malaysia

Abstract

Introduction: Astrocytes are responsible for many essential functions of neurons in CNS. It has been recognised that chronic stress affects the morphology of astrocyte. Natural antioxidant such as honey has been used as one of the therapeutic strategies to lessen the damaging effect of chronic stress on our body. Therefore, the aim of the study is to explore the effect of natural antioxidant, Tualang honey (TH) on the morphology of astrocytes following chronic stress exposure. Methods: Thirty-two male rats were randomly divided into the 4 groups: (i) control, (ii) stress, (iii) honey, (iv) stress plus honey groups.TH was administered via oral gavage at dose of 1.0 g/kg body weight pre and post experiment.

Chronic stress was exposed to animals in group (ii) and (iv) for consecutive 21 days. Anti GFAP immunohistochemistry method was employed to label astrocytes in the medial prefrontal cortex. The number of GFAP+ astrocytes and several parameters related to astrocyte processes were measured. Results: The present study showed that chronic stress reduced the GFAP immunoreactive astrocyte number and percentage of GFAP immunoreactive material. Chronic stress also caused a reduction in astrocyte process ramification as indicated by a reduction in astrocyte total number of processes, average length of processes and maximum number of intersections. However, antioxidant treatment using TH could not reverse these stress-induced changes to the astrocytes. Conclusion: These results demonstrate that chronic stress decreases the number of GFAP immunoreactive astrocyte and cause shrinking of astrocyte processes in stress-sensitive brain region, but these changes cannot be reversed by antioxidant treatment.

Author keywords

Antioxidant; Astrocyte; GFAP; Glial cell; Honey

SciVal Topics

Metrics

Funding details

References (27)

View in search results format >

All

CSV export | Print | E-mail | Save to PDF

Create bibliography

1 Lucassen, P.J., Pruessner, J., Sousa, N., Almeida, O.F.X., Van Dam, A.M., Rajkowska, G., Swaab, D.F., (...), Czéh, B.

Neuropathology of stress

(2014) *Acta Neuropathologica*, 127 (1), pp. 109-135. Cited 306 times.
doi: 10.1007/s00401-013-1223-5

View at Publisher

2 Sharifi-Rad, M., Anil Kumar, N.V., Zucca, P., Varoni, E.M., Dini, L., Panzarini, E., Rajkovic, J., (...), Sharifi-Rad, J.

Lifestyle, Oxidative Stress, and Antioxidants: Back and Forth in the Pathophysiology of Chronic Diseases

(2020) *Frontiers in Physiology*, 11, art. no. 694. Cited 773 times.
http://www.frontiersin.org/Physiology/archive/
doi: 10.3389/fphys.2020.00694

View at Publisher

3 Lupien, S.J., Juster, R.-P., Raymond, C., Marin, M.-F.

The effects of chronic stress on the human brain: From neurotoxicity, to vulnerability, to opportunity

(2018) *Frontiers in Neuroendocrinology*, 49, pp. 91-105. Cited 182 times.
http://www.elsevier.com/inca/publications/store/6/2/2/8/3/4/index.htt
doi: 10.1016/j.yfrne.2018.02.001

View at Publisher

4 Sofroniew, M.V., Vinters, H.V.

Astrocytes: Biology and pathology

(2010) *Acta Neuropathologica*, 119 (1), pp. 7-35. Cited 3605 times.
doi: 10.1007/s00401-009-0619-8

View at Publisher

View PDF

5 McBean, G.J.
Astrocyte antioxidant systems (Open Access)

(2018) *Antioxidants*, 7 (9), art. no. 112. Cited 8 times.
http://www.mdpi.com/2076-3921/7/9/112/pdf
doi: 10.3390/antiox7090112

View at Publisher

6 Tynan, R.J., Beynon, S.B., Hinwood, M., Johnson, S.J., Nilsson, M., Woods, J.J., Walker, F.R.
Chronic stress-induced disruption of the astrocyte network is driven by structural atrophy and not loss of astrocytes

(2013) *Acta Neuropathologica*, 126 (1), pp. 75-91. Cited 135 times.
doi: 10.1007/s00401-013-1102-0

View at Publisher

7 Azman, K.F., Aziz, C.B.A., Zakaria, R., Ahmad, A.H., Shafin, N., Ismail, C.A.N.
Tualang honey: A decade of neurological research (Open Access)

(2021) *Molecules*, 26 (17), art. no. 5424. Cited 5 times.
https://www.mdpi.com/1420-3049/26/17/5424/pdf
doi: 10.3390/molecules26175424

View at Publisher

8 Kishore, R.K., Halim, A.S., Syazana, M.S.N., Sirajudeen, K.N.S.
Tualang honey has higher phenolic content and greater radical scavenging activity compared with other honey sources

(2011) *Nutrition Research*, 31 (4), pp. 322-325. Cited 154 times.
doi: 10.1016/j.nutres.2011.03.001

View at Publisher

9 Asari, M.A., Zulkaflee, M.H., Sirajudeen, K.N.S., Mohd Yusof, N.A., Mohd Sairazi, N.S.
Tualang honey and DHA-rich fish oil reduce the production of pro-inflammatory cytokines in the rat brain following exposure to chronic stress (Open Access)

(2019) *Journal of Taibah University Medical Sciences*, 14 (4), pp. 317-323. Cited 12 times.
http://www.elsevier.com/journals/journal-of-taibah-university-medical-sciences/1658-3612
doi: 10.1016/j.jtumed.2019.06.004

View at Publisher

10 Zamora-González, E.O., Santerre, A., Palomera-Avalos, V., Morales-Villagrán, A.
A chronic combinatory stress model that activates the HPA axis and avoids habituation in BALB/C mice

(2013) *Journal of Neuroscience Methods*, 213 (1), pp. 70-75. Cited 23 times.
doi: 10.1016/j.jneumeth.2012.10.015

View at Publisher

11 Paxinos, G, Watson, C.
(2007) *The rat brain in stereotaxic coordinates*. Cited 41016 times.
Academic Press

12 Schindelin, J., Arganda-Carreras, I., Frise, E., Kaynig, V., Longair, M., Pietzsch, T., Preibisch, S., (...), Cardona, A.

Fiji: An open-source platform for biological-image analysis (Open Access)

(2012) *Nature Methods*, 9 (7), pp. 676-682. Cited 35978 times.
doi: 10.1038/nmeth.2019

View at Publisher

13 Eldomiaty, M.A., Makarenko, O., Hassan, Z.A., Almasry, S.M., Petrov, P., Elnaggar, A.M.

Contribution of glia cells specifically astrocytes in the pathology of depression: Immunohistochemical study in different brain areas

(2020) *Folia Morphologica (Poland)*, 79 (3), pp. 419-428. Cited 10 times.
https://journals.viamedica.pl/folia_morphologica/article/view/FM.a2020.0007/51797
doi: 10.5603/FM.a2020.0007

View at Publisher

14 Tynan, R.J., Naicker, S., Hinwood, M., Nalivaiko, E., Buller, K.M., Pow, D.V., Day, T.A., (...), Walker, F.R.

Chronic stress alters the density and morphology of microglia in a subset of stress-responsive brain regions

(2010) *Brain, Behavior, and Immunity*, 24 (7), pp. 1058-1068. Cited 404 times.
doi: 10.1016/j.bbi.2010.02.001

View at Publisher

15 Yang, Z., Wang, K.K.W.

Glial fibrillary acidic protein: From intermediate filament assembly and gliosis to neurobiomarker (Open Access)

(2015) *Trends in Neurosciences*, 38 (6), pp. 364-374. Cited 492 times.
www.elsevier.com/locate/tins
doi: 10.1016/j.tins.2015.04.003

View at Publisher

16 Ding, X.-F., Liu, Y., Yan, Z.-Y., Li, X.-J., Ma, Q.-Y., Jin, Z.-Y., Liu, Y., (...), Lv, Z.-P.

Involvement of Normalized Glial Fibrillary Acidic Protein Expression in the Hippocampi in Antidepressant-Like Effects of Xiaoyaosan on Chronically Stressed Mice (Open Access)

(2017) *Evidence-based Complementary and Alternative Medicine*, 2017, art. no. 1960584. Cited 29 times.
http://www.hindawi.com/journals/ecam/contents.html
doi: 10.1155/2017/1960584

View at Publisher

17 Walker, R, Tynan, R, Beynon, S, Nilsson, M.
Chronic stress induces profound structural atrophy of astrocytes within the prefrontal cortex:An emerging story in glial remodeling in response to stress
(2013) *Brain, Behavior, and Immunity*, 32, pp. e20-e21. Cited 2 times.

18 Luis Bender, C., Sun, X., Farooq, M., Yang, Q., Davison, C., Maroteaux, M., Huang, Y.-S., (...), Liu, S.J.

Emotional stress induces structural plasticity in Bergmann glial cells via an AC5–CPEB3–GluA1 pathway (Open Access)

(2020) *Journal of Neuroscience*, 40 (17), pp. 3374-3384. Cited 16 times.
https://www.jneurosci.org/content/40/17/3374
doi: 10.1523/JNEUROSCI.0013-19.2020

View at Publisher

19 Banasr, M., Duman, R.S.

Glial Loss in the Prefrontal Cortex Is Sufficient to Induce Depressive-like Behaviors (Open Access)

(2008) *Biological Psychiatry*, 64 (10), pp. 863-870. Cited 460 times.
doi: 10.1016/j.biopsych.2008.06.008

View at Publisher

20 Banasr, M., Duman, R.S.

Regulation of neurogenesis and gliogenesis by stress and antidepressant treatment (Open Access)

(2007) *CNS and Neurological Disorders - Drug Targets*, 6 (5), pp. 311-320. Cited 141 times.
http://www.ingentaconnect.com/content/ben/cnsnddt/2007/00000006/00000005/art00003
doi: 10.2174/187152707783220929

View at Publisher

21 Saab, A.S., Neumeyer, A., Jahn, H.M., Cupido, A., Šimek, A.A.M., Boele, H.-J., Scheller, A., (...), Kirchhoff, F.

Bergmann glial AMPA receptors are required for fine motor coordination

(2012) *Science*, 337 (6095), pp. 749-753. Cited 148 times.
http://www.sciencemag.org/content/337/6095/749.full.pdf
doi: 10.1126/science.1221140

View at Publisher

22 Serapide, M.F., L'Episcopo, F., Tirolo, C., Testa, N., Caniglia, S., Giachino, C., Marchetti, B.

Boosting Antioxidant Self-defenses by Grafting Astrocytes Rejuvenates the Aged Microenvironment and Mitigates Nigrostriatal Toxicity in Parkinsonian Brain via an Nrf2-Driven Wnt/β-Catenin Prosurvival Axis

(2020) *Frontiers in Aging Neuroscience*, 12, art. no. 24. Cited 19 times.
https://www.frontiersin.org/journals/aging-neuroscience#
doi: 10.3389/fnagi.2020.00024

View at Publisher

23 Lee, K.H., Cha, M., Lee, B.H.

Neuroprotective effect of antioxidants in the brain (Open Access)

(2020) *International Journal of Molecular Sciences*, 21 (19), art. no. 7152, pp. 1-29. Cited 173 times.
https://www.mdpi.com/1422-0067/21/19/7152/pdf
doi: 10.3390/ijms21197152

View at Publisher

24 Alvarez-Suarez, J.M., Giampieri, F., Cordero, M., Gasparrini, M., Forbes-Hernández, T.Y., Mazzoni, L., Afrin, S., (...), Battino, M.

Activation of AMPK/Nrf2 signalling by Manuka honey protects human dermal fibroblasts against oxidative damage by improving antioxidant response and mitochondrial function promoting wound healing (Open Access)

(2016) *Journal of Functional Foods*, 25, pp. 38-49. Cited 127 times.
http://www.elsevier.com/wps/find/journaldescription.cws_home/717426/description#description
doi: 10.1016/j.jff.2016.05.008

View at Publisher

25 Elmann, A., Telerman, A., Mordechay, S., Erlank, H., Ofir, R.

Antioxidant and astroprotective effects of a pulicaria incisa infusion (Open Access)

(2012) *Oxidative Medicine and Cellular Longevity*, art. no. 157598. Cited 14 times.
doi: 10.1155/2012/157598

View at Publisher

26 Tafere, DA.
Chemical Composition and uses of Honey: A Review
(2021) *Journal of Food Science and Nutrition Research*, 4 (3), pp. 194-201. Cited 23 times.

27 Al-Rahbi, B, Zakaria, R, Othman, Z, Hassan, A, Ahmad, AH.
Protective Effects of Tualang Honey against Oxidative Stress and Anxiety-Like Behaviour in Stressed Ovariectomized Rats
(2014) *International Scholarly Research Notices*, 2014, pp. 1-10. Cited 33 times.

Asari, M.A.; Department of Anatomy, School of Medical Sciences, Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kota Bharu, Kelantan, Malaysia;
email:asnizam@usm.my

View PDF

About Scopus

What is Scopus

Content coverage

Scopus blog

Scopus API

Privacy matters

Language

日本語版を表示する

查看简体中文版本

查看繁體中文版本

Просмотр версии на русском языке

Customer Service

Help

Tutorials

Contact us