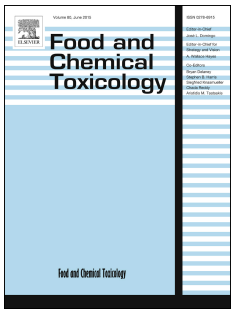
# Accepted Manuscript




The toxic influence of paraquat on hippocampal neurogenesis in adult mice

Kaikai Li, Xinran Cheng, Jinhua Jiang, Jiutao Wang, Jiongfang Xie, Xinde Hu, Yingxue Huang, Lingzhen Song, Mengmeng Liu, Leiming Cai, Liezhong Chen, Shanting Zhao

PII: S0278-6915(17)30303-4

DOI: 10.1016/j.fct.2017.05.067

Reference: FCT 9102

To appear in: *Food and Chemical Toxicology*

Received Date: 7 February 2017

Revised Date: 26 May 2017

Accepted Date: 29 May 2017

Please cite this article as: Li, K., Cheng, X., Jiang, J., Wang, J., Xie, J., Hu, X., Huang, Y., Song, L., Liu, M., Cai, L., Chen, L., Zhao, S., The toxic influence of paraquat on hippocampal neurogenesis in adult mice, *Food and Chemical Toxicology* (2017), doi: 10.1016/j.fct.2017.05.067.

# The Toxic Influence of Paraquat on Hippocampal Neurogenesis in Adult Mice

Kaikai Li[a], Xinran Cheng[a], Jinhua Jiang[b], Jiutao Wang[a,c], Jiongfang Xie[a], Xinde Hu[a], Yingxue Huang[a], Lingzhen Song[a], Mengmeng Liu[a], Leiming Cai[b], Liezhong Chen[b*], Shanting Zhao[a*]

[a]*College of Veterinary Medicine, Northwest A&F University, Yangling, Shaanxi, 712100, People's Republic of China.*

[b]*Zhejiang Academy of Agricultural Science, Hangzhou, Zhejiang, 310021, People's Republic of China.*

[c]*China-US (Henan) Hormel Cancer Institute, Zhengzhou, Henan, 450003, People's Republic of China.*

**Abstract:** Paraquat, a fast-acting non-selective contact herbicide, is considered an etiological factor related to Parkinson's disease. This study investigated its effects on hippocampal neurogenesis and cognition in adult mice as well as possible mechanisms for the effects. We administered paraquat (1.25 mg/kg, intraperitoneal injection, i.p.) and an equal volume of normal saline for 3 weeks to adult male C57BL/6J mice. The results showed that hippocampus-dependent spatial learning and memory was significantly impaired in paraquat-treated mice. Moreover, paraquat administration inhibited the proliferation of neural progenitor cells, and impaired the survival and altered the fate decision of newly generated cells in the hippocampus. The expression levels of caspase-3 and glial fibrillary acidic protein were significantly higher in paraquat-treated mice than in control mice. Interestingly, paraquat reduced the phosphorylation of Akt, but did not affect the total amount of Akt. In conclusion, our findings suggest that paraquat negatively affected adult hippocampal neurogenesis and cognition function.

**Key Words**: paraquat; learning; memory; neurogenesis; phosphorylation

*Corresponding authors